# Department of Defense
# Fiscal Year (FY) 2019 Budget Estimates

February 2018

## Navy

*Justification Book Volume 2 of 5*

## *Research, Development, Test & Evaluation, Navy*

## Budget Activity 4

The estimated cost for this report for the Department of the Navy (DON) is $94,790.

The estimated total cost for supporting the DON budget justification material is approximately $1,643,653 for the 2018 fiscal year. This includes $79,753 in supplies and $1,563,900 in labor.

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## Research, Development, Test and Evaluation, Navy

For expenses necessary for basic and applied scientific research, development, test and evaluation, including maintenance, rehabilitation, lease, and operation of facilities and equipment, $18,649,478,000 to remain available for obligation until September 30, 2020.

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Department of Defense
FY 2019 President's Budget
Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

| Appropriation | FY 2017 (Base + OCO) | FY 2018 PB Request with CR Adj Base | FY 2018 Total PB Requests* with CR Adj Base | FY 2018 PB Request with CR Adj OCO | FY 2018 Total PB Requests+ with CR Adj OCO |
|---|---|---|---|---|---|
| Research, Development, Test & Eval, Navy | 17,851,955 | 17,116,976 | 17,091,976 | 326,537 | 326,537 |
| Total Research, Development, Test & Evaluation | 17,851,955 | 17,116,976 | 17,091,976 | 326,537 | 326,537 |
| Other RDT&E Budget Activities Not Included in the Research, Development, Test and Evaluation Title | | | | | |
| National Defense Sealift Fund | 7,237 | 18,622 | 18,622 | | |
| Total Not in Research, Development, Test & Evaluation | 7,237 | 18,622 | 18,622 | | |

Department of Defense
FY 2019 President's Budget
Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

| Appropriation | FY 2018 Emergency Requests** Emergency | FY 2018 Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req Emergency | FY 2018 Total PB Requests* with CR Adj Base + OCO + Emergency** | FY 2018 Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req with CR Adj Base + OCO + Emergency |
|---|---|---|---|---|---|---|
| Research, Development, Test & Eval, Navy | 60,000 | -60,000 | | 17,478,513 | -60,000 | 17,418,513 |
| Total Research, Development, Test & Evaluation | 60,000 | -60,000 | | 17,478,513 | -60,000 | 17,418,513 |
| Other RDT&E Budget Activities Not Included in the Research, Development, Test and Evaluation Title | | | | | | |
| National Defense Sealift Fund | | | | 18,622 | | 18,622 |
| Total Not in Research, Development, Test & Evaluation | | | | 18,622 | | 18,622 |

Department of Defense
FY 2019 President's Budget
Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

| Appropriation | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|
| Research, Development, Test & Eval, Navy | 18,451,066 | 198,412 | 18,649,478 |
| Total Research, Development, Test & Evaluation | 18,451,066 | 198,412 | 18,649,478 |

Other RDT&E Budget Activities Not Included in the Research, Development, Test and Evaluation Title

| | | | |
|---|---|---|---|
| National Defense Sealift Fund | | | |
| Total Not in Research, Development, Test & Evaluation | | | |

Department of Defense
FY 2019 President's Budget
Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

| Summary Recap of Budget Activities | FY 2017 (Base + OCO) | FY 2018 PB Request with CR Adj Base | FY 2018 Total PB Requests* with CR Adj Base | FY 2018 PB Request with CR Adj OCO | FY 2018 Total PB Requests+ with CR Adj OCO |
|---|---|---|---|---|---|
| Basic Research | 549,384 | 595,901 | 595,901 | | |
| Applied Research | 954,884 | 886,079 | 886,079 | | |
| Advanced Technology Development | 811,211 | 686,342 | 686,342 | | |
| Advanced Component Development & Prototypes | 4,510,800 | 4,218,714 | 4,193,714 | 27,710 | 59,510 |
| System Development & Demonstration | 5,928,185 | 6,362,102 | 6,362,102 | | 5,400 |
| Management Support | 1,279,290 | 945,757 | 945,757 | | |
| Operational Systems Development | 3,818,201 | 3,980,140 | 3,980,140 | 102,655 | 102,655 |
| Undistributed | | -558,059 | -558,059 | 196,172 | 158,972 |
| Total Research, Development, Test & Evaluation | 17,851,955 | 17,116,976 | 17,091,976 | 326,537 | 326,537 |

| Summary Recap of FYDP Programs | | | | | |
|---|---|---|---|---|---|
| Strategic Forces | 187,327 | 201,735 | 201,735 | | |
| General Purpose Forces | 1,407,847 | 1,675,797 | 1,675,797 | 12,800 | 12,800 |
| Intelligence and Communications | 927,792 | 751,779 | 751,779 | | |
| Research and Development | 13,686,598 | 13,589,349 | 13,564,349 | 27,710 | 64,910 |
| Central Supply and Maintenance | 40,169 | 43,035 | 43,035 | | |
| Administration and Associated Activities | 136 | -556,310 | -556,310 | 196,172 | 158,972 |
| Space | | 47,244 | 47,244 | | |
| Classified Programs | 1,602,086 | 1,364,347 | 1,364,347 | 89,855 | 89,855 |
| Total Research, Development, Test & Evaluation | 17,851,955 | 17,116,976 | 17,091,976 | 326,537 | 326,537 |

Department of Defense
FY 2019 President's Budget
Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

| Summary Recap of Budget Activities | FY 2018 Emergency Requests** Emergency | FY 2018 Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req Emergency | FY 2018 Total PB Requests* with CR Adj Base + OCO + Emergency** | FY 2018 Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req with CR Adj Base + OCO + Emergency |
|---|---|---|---|---|---|---|
| Basic Research | | | | 595,901 | | 595,901 |
| Applied Research | | | | 886,079 | | 886,079 |
| Advanced Technology Development | | | | 686,342 | | 686,342 |
| Advanced Component Development & Prototypes | | | | 4,253,224 | | 4,253,224 |
| System Development & Demonstration | | | | 6,367,502 | | 6,367,502 |
| Management Support | | | | 945,757 | | 945,757 |
| Operational Systems Development | 60,000 | -60,000 | | 4,142,795 | -60,000 | 4,082,795 |
| Undistributed | | | | -399,087 | | -399,087 |
| Total Research, Development, Test & Evaluation | 60,000 | -60,000 | | 17,478,513 | -60,000 | 17,418,513 |

| Summary Recap of FYDP Programs | | | | | | |
|---|---|---|---|---|---|---|
| Strategic Forces | | | | 201,735 | | 201,735 |
| General Purpose Forces | | | | 1,688,597 | | 1,688,597 |
| Intelligence and Communications | | | | 751,779 | | 751,779 |
| Research and Development | | | | 13,629,259 | | 13,629,259 |
| Central Supply and Maintenance | | | | 43,035 | | 43,035 |
| Administration and Associated Activities | | | | -397,338 | | -397,338 |
| Space | | | | 47,244 | | 47,244 |
| Classified Programs | 60,000 | -60,000 | | 1,514,202 | -60,000 | 1,454,202 |
| Total Research, Development, Test & Evaluation | 60,000 | -60,000 | | 17,478,513 | -60,000 | 17,418,513 |

Department of Defense
FY 2019 President's Budget
Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

| Summary Recap of Budget Activities | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|
| Basic Research | 597,378 | | 597,378 |
| Applied Research | 891,471 | | 891,471 |
| Advanced Technology Development | 750,995 | | 750,995 |
| Advanced Component Development & Prototypes | 4,293,713 | 33,300 | 4,327,013 |
| System Development & Demonstration | 6,042,480 | 1,100 | 6,043,580 |
| Management Support | 1,020,569 | | 1,020,569 |
| Operational Systems Development | 4,854,460 | 164,012 | 5,018,472 |
| Undistributed | | | |
| Total Research, Development, Test & Evaluation | 18,451,066 | 198,412 | 18,649,478 |

| Summary Recap of FYDP Programs | | | |
|---|---|---|---|
| Strategic Forces | 251,501 | | 251,501 |
| General Purpose Forces | 1,982,258 | 16,130 | 1,998,388 |
| Intelligence and Communications | 626,028 | | 626,028 |
| Research and Development | 13,979,095 | 34,400 | 14,013,495 |
| Central Supply and Maintenance | 43,844 | | 43,844 |
| Administration and Associated Activities | 1,579 | | 1,579 |
| Space | 47,858 | | 47,858 |
| Classified Programs | 1,518,903 | 147,882 | 1,666,785 |
| Total Research, Development, Test & Evaluation | 18,451,066 | 198,412 | 18,649,478 |

Department of Defense
FY 2019 President's Budget
Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

| | FY 2017 (Base + OCO) | FY 2018 PB Request with CR Adj Base | FY 2018 Total PB Requests* with CR Adj Base | FY 2018 PB Request with CR Adj OCO | FY 2018 Total PB Requests+ with CR Adj OCO |
|---|---|---|---|---|---|
| Summary Recap of Non-RDT&E Title FYDP Programs | | | | | |
| Mobility Forces | 7,237 | 18,622 | 18,622 | | |
| Total Research, Development, Test & Evaluation | 7,237 | 18,622 | 18,622 | | |

Department of Defense
FY 2019 President's Budget
Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

| | FY 2018 Emergency Requests** | FY 2018 Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req Emergency | FY 2018 Total PB Requests* with CR Adj Base + OCO + Emergency** | FY 2018 Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req with CR Adj Base + OCO + Emergency |
|---|---|---|---|---|---|---|
| Summary Recap of Non-RDT&E Title FYDP Programs | | | | | | |
| Mobility Forces | | | | 18,622 | | 18,622 |
| Total Research, Development, Test & Evaluation | | | | 18,622 | | 18,622 |

Department of Defense
FY 2019 President's Budget
Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

| | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|
| Summary Recap of Non-RDT&E Title FYDP Programs | | | |
| Mobility Forces | | | |
| Total Research, Development, Test & Evaluation | | | |

Department of the Navy
FY 2019 President's Budget
Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

| Summary Recap of Budget Activities | FY 2017 (Base + OCO) | FY 2018 PB Request with CR Adj Base | FY 2018 Total PB Requests* with CR Adj Base | FY 2018 PB Request with CR Adj OCO | FY 2018 Total PB Requests+ with CR Adj OCO |
|---|---|---|---|---|---|
| Basic Research | 549,384 | 595,901 | 595,901 | | |
| Applied Research | 954,884 | 886,079 | 886,079 | | |
| Advanced Technology Development | 811,211 | 686,342 | 686,342 | | |
| Advanced Component Development & Prototypes | 4,510,800 | 4,218,714 | 4,193,714 | 27,710 | 59,510 |
| System Development & Demonstration | 5,928,185 | 6,362,102 | 6,362,102 | | 5,400 |
| Management Support | 1,279,290 | 945,757 | 945,757 | | |
| Operational Systems Development | 3,818,201 | 3,980,140 | 3,980,140 | 102,655 | 102,655 |
| Undistributed | | -558,059 | -558,059 | 196,172 | 158,972 |
| Total Research, Development, Test & Evaluation | 17,851,955 | 17,116,976 | 17,091,976 | 326,537 | 326,537 |

| Summary Recap of FYDP Programs | | | | | |
|---|---|---|---|---|---|
| Strategic Forces | 187,327 | 201,735 | 201,735 | | |
| General Purpose Forces | 1,407,847 | 1,675,797 | 1,675,797 | 12,800 | 12,800 |
| Intelligence and Communications | 927,792 | 751,779 | 751,779 | | |
| Research and Development | 13,686,598 | 13,589,349 | 13,564,349 | 27,710 | 64,910 |
| Central Supply and Maintenance | 40,169 | 43,035 | 43,035 | | |
| Administration and Associated Activities | 136 | -556,310 | -556,310 | 196,172 | 158,972 |
| Space | | 47,244 | 47,244 | | |
| Classified Programs | 1,602,086 | 1,364,347 | 1,364,347 | 89,855 | 89,855 |
| Total Research, Development, Test & Evaluation | 17,851,955 | 17,116,976 | 17,091,976 | 326,537 | 326,537 |

Department of the Navy
FY 2019 President's Budget
Exhibit R-1 FY 2019 President's Budget
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(Dollars in Thousands)

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| Applied Research | | | | 886,079 | | 886,079 |
| Advanced Technology Development | | | | 686,342 | | 686,342 |
| Advanced Component Development & Prototypes | | | | 4,253,224 | | 4,253,224 |
| System Development & Demonstration | | | | 6,367,502 | | 6,367,502 |
| Management Support | | | | 945,757 | | 945,757 |
| Operational Systems Development | 60,000 | -60,000 | | 4,142,795 | -60,000 | 4,082,795 |
| Undistributed | | | | -399,087 | | -399,087 |
| Total Research, Development, Test & Evaluation | 60,000 | -60,000 | | 17,478,513 | -60,000 | 17,418,513 |

| Summary Recap of FYDP Programs | | | | | | |
|---|---|---|---|---|---|---|
| Strategic Forces | | | | 201,735 | | 201,735 |
| General Purpose Forces | | | | 1,688,597 | | 1,688,597 |
| Intelligence and Communications | | | | 751,779 | | 751,779 |
| Research and Development | | | | 13,629,259 | | 13,629,259 |
| Central Supply and Maintenance | | | | 43,035 | | 43,035 |
| Administration and Associated Activities | | | | -397,338 | | -397,338 |
| Space | | | | 47,244 | | 47,244 |
| Classified Programs | 60,000 | -60,000 | | 1,514,202 | -60,000 | 1,454,202 |
| Total Research, Development, Test & Evaluation | 60,000 | -60,000 | | 17,478,513 | -60,000 | 17,418,513 |

Department of the Navy
FY 2019 President's Budget
Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

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|---|---|---|---|
| Basic Research | 597,378 | | 597,378 |
| Applied Research | 891,471 | | 891,471 |
| Advanced Technology Development | 750,995 | | 750,995 |
| Advanced Component Development & Prototypes | 4,293,713 | 33,300 | 4,327,013 |
| System Development & Demonstration | 6,042,480 | 1,100 | 6,043,580 |
| Management Support | 1,020,569 | | 1,020,569 |
| Operational Systems Development | 4,854,460 | 164,012 | 5,018,472 |
| Undistributed | | | |
| Total Research, Development, Test & Evaluation | 18,451,066 | 198,412 | 18,649,478 |

| Summary Recap of FYDP Programs | | | |
|---|---|---|---|
| Strategic Forces | 251,501 | | 251,501 |
| General Purpose Forces | 1,982,258 | 16,130 | 1,998,388 |
| Intelligence and Communications | 626,028 | | 626,028 |
| Research and Development | 13,979,095 | 34,400 | 14,013,495 |
| Central Supply and Maintenance | 43,844 | | 43,844 |
| Administration and Associated Activities | 1,579 | | 1,579 |
| Space | 47,858 | | 47,858 |
| Classified Programs | 1,518,903 | 147,882 | 1,666,785 |
| Total Research, Development, Test & Evaluation | 18,451,066 | 198,412 | 18,649,478 |

Department of the Navy
FY 2019 President's Budget
Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2017 (Base + OCO) | FY 2018 PB Request with CR Adj Base | FY 2018 Total PB Requests* with CR Adj Base | FY 2018 PB Request with CR Adj OCO | FY 2018 Total PB Requests+ with CR Adj OCO | Sec |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0601103N | University Research Initiatives | 01 | 117,320 | 118,130 | 118,130 | | | U |
| 2 | 0601152N | In-House Laboratory Independent Research | 01 | 18,238 | 19,438 | 19,438 | | | U |
| 3 | 0601153N | Defense Research Sciences | 01 | 413,826 | 458,333 | 458,333 | | | U |
| | Basic | Research | | 549,384 | 595,901 | 595,901 | | | |
| 4 | 0602114N | Power Projection Applied Research | 02 | 69,950 | 13,553 | 13,553 | | | U |
| 5 | 0602123N | Force Protection Applied Research | 02 | 192,579 | 125,557 | 125,557 | | | U |
| 6 | 0602131M | Marine Corps Landing Force Technology | 02 | 67,874 | 53,936 | 53,936 | | | U |
| 7 | 0602235N | Common Picture Applied Research | 02 | 40,649 | 36,450 | 36,450 | | | U |
| 8 | 0602236N | Warfighter Sustainment Applied Research | 02 | 50,465 | 48,649 | 48,649 | | | U |
| 9 | 0602271N | Electromagnetic Systems Applied Research | 02 | 114,613 | 79,598 | 79,598 | | | U |
| 10 | 0602435N | Ocean Warfighting Environment Applied Research | 02 | 79,941 | 42,411 | 42,411 | | | U |
| 11 | 0602651M | Joint Non-Lethal Weapons Applied Research | 02 | 6,146 | 6,425 | 6,425 | | | U |
| 12 | 0602747N | Undersea Warfare Applied Research | 02 | 120,537 | 56,094 | 56,094 | | | U |
| 13 | 0602750N | Future Naval Capabilities Applied Research | 02 | 152,427 | 156,805 | 156,805 | | | U |
| 14 | 0602782N | Mine and Expeditionary Warfare Applied Research | 02 | 31,256 | 32,733 | 32,733 | | | U |

Department of the Navy
FY 2019 President's Budget
Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2018 Emergency Requests** Emergency | FY 2018 Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req Emergency | FY 2018 Total PB Requests* with CR Adj Base + OCO + Emergency** | FY 2018 Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req with CR Adj Base + OCO + Emergency | Sec |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0601103N | University Research Initiatives | 01 | | | | 118,130 | | 118,130 | U |
| 2 | 0601152N | In-House Laboratory Independent Research | 01 | | | | 19,438 | | 19,438 | U |
| 3 | 0601153N | Defense Research Sciences | 01 | | | | 458,333 | | 458,333 | U |
| | Basic Research | | | | | | 595,901 | | 595,901 | |
| 4 | 0602114N | Power Projection Applied Research | 02 | | | | 13,553 | | 13,553 | U |
| 5 | 0602123N | Force Protection Applied Research | 02 | | | | 125,557 | | 125,557 | U |
| 6 | 0602131M | Marine Corps Landing Force Technology | 02 | | | | 53,936 | | 53,936 | U |
| 7 | 0602235N | Common Picture Applied Research | 02 | | | | 36,450 | | 36,450 | U |
| 8 | 0602236N | Warfighter Sustainment Applied Research | 02 | | | | 48,649 | | 48,649 | U |
| 9 | 0602271N | Electromagnetic Systems Applied Research | 02 | | | | 79,598 | | 79,598 | U |
| 10 | 0602435N | Ocean Warfighting Environment Applied Research | 02 | | | | 42,411 | | 42,411 | U |
| 11 | 0602651M | Joint Non-Lethal Weapons Applied Research | 02 | | | | 6,425 | | 6,425 | U |
| 12 | 0602747N | Undersea Warfare Applied Research | 02 | | | | 56,094 | | 56,094 | U |
| 13 | 0602750N | Future Naval Capabilities Applied Research | 02 | | | | 156,805 | | 156,805 | U |
| 14 | 0602782N | Mine and Expeditionary Warfare Applied Research | 02 | | | | 32,733 | | 32,733 | U |

Department of the Navy
FY 2019 President's Budget
Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2019 Base | FY 2019 OCO | FY 2019 Total | Sec |
|---|---|---|---|---|---|---|---|
| 1 | 0601103N | University Research Initiatives | 01 | 119,433 | | 119,433 | U |
| 2 | 0601152N | In-House Laboratory Independent Research | 01 | 19,237 | | 19,237 | U |
| 3 | 0601153N | Defense Research Sciences | 01 | 458,708 | | 458,708 | U |
| | Basic | Research | | 597,378 | | 597,378 | |
| 4 | 0602114N | Power Projection Applied Research | 02 | 14,643 | | 14,643 | U |
| 5 | 0602123N | Force Protection Applied Research | 02 | 124,049 | | 124,049 | U |
| 6 | 0602131M | Marine Corps Landing Force Technology | 02 | 59,607 | | 59,607 | U |
| 7 | 0602235N | Common Picture Applied Research | 02 | 36,348 | | 36,348 | U |
| 8 | 0602236N | Warfighter Sustainment Applied Research | 02 | 56,197 | | 56,197 | U |
| 9 | 0602271N | Electromagnetic Systems Applied Research | 02 | 83,800 | | 83,800 | U |
| 10 | 0602435N | Ocean Warfighting Environment Applied Research | 02 | 42,998 | | 42,998 | U |
| 11 | 0602651M | Joint Non-Lethal Weapons Applied Research | 02 | 6,349 | | 6,349 | U |
| 12 | 0602747N | Undersea Warfare Applied Research | 02 | 58,049 | | 58,049 | U |
| 13 | 0602750N | Future Naval Capabilities Applied Research | 02 | 147,771 | | 147,771 | U |
| 14 | 0602782N | Mine and Expeditionary Warfare Applied Research | 02 | 37,545 | | 37,545 | U |

Department of the Navy
FY 2019 President's Budget
Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2017 (Base + OCO) | FY 2018 PB Request with CR Adj Base | FY 2018 Total PB Requests* with CR Adj Base | FY 2018 PB Request with CR Adj OCO | FY 2018 Total PB Requests+ with CR Adj OCO | Sec |
|---|---|---|---|---|---|---|---|---|---|
| 15 | 0602792N | Innovative Naval Prototypes (INP) Applied Research | 02 | | 171,146 | 171,146 | | | U |
| 16 | 0602861N | Science and Technology Management - ONR Field Acitivities | 02 | | 62,722 | 62,722 | | | U |
| 17 | 0602898N | Science and Technology Management - ONR Headquarters | 02 | 28,447 | | | | | U |
| | | Applied Research | | 954,884 | 886,079 | 886,079 | | | |
| 18 | 0603114N | Power Projection Advanced Technology | 03 | 97,122 | | | | | U |
| 19 | 0603123N | Force Protection Advanced Technology | 03 | 83,146 | 26,342 | 26,342 | | | U |
| 20 | 0603271N | Electromagnetic Systems Advanced Technology | 03 | 25,726 | 9,360 | 9,360 | | | U |
| 21 | 0603640M | USMC Advanced Technology Demonstration (ATD) | 03 | 137,190 | 154,407 | 154,407 | | | U |
| 22 | 0603651M | Joint Non-Lethal Weapons Technology Development | 03 | 12,790 | 13,448 | 13,448 | | | U |
| 23 | 0603671N | Navy Advanced Technology Development (ATD) | 03 | | | | | | U |
| 24 | 0603673N | Future Naval Capabilities Advanced Technology Development | 03 | 254,203 | 231,772 | 231,772 | | | U |
| 25 | 0603680N | Manufacturing Technology Program | 03 | 55,555 | 57,797 | 57,797 | | | U |
| 26 | 0603729N | Warfighter Protection Advanced Technology | 03 | 39,486 | 4,878 | 4,878 | | | U |
| 27 | 0603747N | Undersea Warfare Advanced Technology | 03 | 25,352 | | | | | U |
| 28 | 0603758N | Navy Warfighting Experiments and Demonstrations | 03 | 67,965 | 64,889 | 64,889 | | | U |

Department of the Navy
FY 2019 President's Budget
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Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2018 Emergency Requests** Emergency | FY 2018 Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req Emergency | FY 2018 Total PB Requests* with CR Adj Base + OCO + Emergency** | FY 2018 Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req with CR Adj Base + OCO + Emergency | Sec |
|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 0602792N | Innovative Naval Prototypes (INP) Applied Research | 02 | | | | 171,146 | | 171,146 | U |
| 16 | 0602861N | Science and Technology Management - ONR Field Acitivities | 02 | | | | 62,722 | | 62,722 | U |
| 17 | 0602898N | Science and Technology Management - ONR Headquarters | 02 | | | | | | | U |
| | | Applied Research | | | | | 886,079 | | 886,079 | |
| 18 | 0603114N | Power Projection Advanced Technology | 03 | | | | | | | U |
| 19 | 0603123N | Force Protection Advanced Technology | 03 | | | | 26,342 | | 26,342 | U |
| 20 | 0603271N | Electromagnetic Systems Advanced Technology | 03 | | | | 9,360 | | 9,360 | U |
| 21 | 0603640M | USMC Advanced Technology Demonstration (ATD) | 03 | | | | 154,407 | | 154,407 | U |
| 22 | 0603651M | Joint Non-Lethal Weapons Technology Development | 03 | | | | 13,448 | | 13,448 | U |
| 23 | 0603671N | Navy Advanced Technology Development (ATD) | 03 | | | | | | | U |
| 24 | 0603673N | Future Naval Capabilities Advanced Technology Development | 03 | | | | 231,772 | | 231,772 | U |
| 25 | 0603680N | Manufacturing Technology Program | 03 | | | | 57,797 | | 57,797 | U |
| 26 | 0603729N | Warfighter Protection Advanced Technology | 03 | | | | 4,878 | | 4,878 | U |
| 27 | 0603747N | Undersea Warfare Advanced Technology | 03 | | | | | | | U |
| 28 | 0603758N | Navy Warfighting Experiments and Demonstrations | 03 | | | | 64,889 | | 64,889 | U |

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Total Obligational Authority
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Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2019 Base | FY 2019 OCO | FY 2019 Total | Sec |
|---|---|---|---|---|---|---|---|
| 15 | 0602792N | Innovative Naval Prototypes (INP) Applied Research | 02 | 159,697 | | 159,697 | U |
| 16 | 0602861N | Science and Technology Management - ONR Field Acitivities | 02 | 64,418 | | 64,418 | U |
| 17 | 0602898N | Science and Technology Management - ONR Headquarters | 02 | | | | U |
| | | Applied Research | | 891,471 | | 891,471 | |
| 18 | 0603114N | Power Projection Advanced Technology | 03 | | | | U |
| 19 | 0603123N | Force Protection Advanced Technology | 03 | 2,423 | | 2,423 | U |
| 20 | 0603271N | Electromagnetic Systems Advanced Technology | 03 | | | | U |
| 21 | 0603640M | USMC Advanced Technology Demonstration (ATD) | 03 | 150,245 | | 150,245 | U |
| 22 | 0603651M | Joint Non-Lethal Weapons Technology Development | 03 | 13,313 | | 13,313 | U |
| 23 | 0603671N | Navy Advanced Technology Development (ATD) | 03 | 131,502 | | 131,502 | U |
| 24 | 0603673N | Future Naval Capabilities Advanced Technology Development | 03 | 232,996 | | 232,996 | U |
| 25 | 0603680N | Manufacturing Technology Program | 03 | 58,657 | | 58,657 | U |
| 26 | 0603729N | Warfighter Protection Advanced Technology | 03 | | | | U |
| 27 | 0603747N | Undersea Warfare Advanced Technology | 03 | | | | U |
| 28 | 0603758N | Navy Warfighting Experiments and Demonstrations | 03 | | | | U |

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(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2017 (Base + OCO) | FY 2018 PB Request with CR Adj Base | FY 2018 Total PB Requests* with CR Adj Base | FY 2018 PB Request with CR Adj OCO | FY 2018 Total PB Requests+ with CR Adj OCO | Sec |
|---|---|---|---|---|---|---|---|---|---|
| 29 | 0603782N | Mine and Expeditionary Warfare Advanced Technology | 03 | 12,676 | 15,164 | 15,164 | | | U |
| 30 | 0603801N | Innovative Naval Prototypes (INP) Advanced Technology Development | 03 | | 108,285 | 108,285 | | | U |
| | | Advanced Technology Development | | 811,211 | 686,342 | 686,342 | | | |
| 31 | 0603207N | Air/Ocean Tactical Applications | 04 | 44,175 | 48,365 | 48,365 | | | U |
| 32 | 0603216N | Aviation Survivability | 04 | 14,811 | 5,566 | 5,566 | | | U |
| 33 | 0603251N | Aircraft Systems | 04 | 1,519 | 695 | 695 | | | U |
| 34 | 0603254N | ASW Systems Development | 04 | 6,877 | 7,661 | 7,661 | | | U |
| 35 | 0603261N | Tactical Airborne Reconnaissance | 04 | 3,265 | 3,707 | 3,707 | | | U |
| 36 | 0603382N | Advanced Combat Systems Technology | 04 | 3,583 | 61,381 | 61,381 | | | U |
| 37 | 0603502N | Surface and Shallow Water Mine Countermeasures | 04 | 126,761 | 154,117 | 154,117 | | | U |
| 38 | 0603506N | Surface Ship Torpedo Defense | 04 | 69,872 | 14,974 | 14,974 | | | U |
| 39 | 0603512N | Carrier Systems Development | 04 | 7,516 | 9,296 | 9,296 | | | U |
| 40 | 0603525N | PILOT FISH | 04 | 137,435 | 132,083 | 132,083 | | | U |
| 41 | 0603527N | RETRACT LARCH | 04 | 48,583 | 15,407 | 15,407 | 22,000 | 22,000 | U |
| 42 | 0603536N | RETRACT JUNIPER | 04 | 107,871 | 122,413 | 122,413 | | | U |
| 43 | 0603542N | Radiological Control | 04 | 677 | 745 | 745 | | | U |
| 44 | 0603553N | Surface ASW | 04 | 1,039 | 1,136 | 1,136 | | | U |
| 45 | 0603561N | Advanced Submarine System Development | 04 | 120,289 | 100,955 | 100,955 | | | U |

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(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2018 Emergency Requests** | FY 2018 Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req Emergency | FY 2018 Total PB Requests* with CR Adj Base + OCO + Emergency** | FY 2018 Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req with CR Adj Base + OCO + Emergency | Sec |
|---|---|---|---|---|---|---|---|---|---|---|
| 29 | 0603782N | Mine and Expeditionary Warfare Advanced Technology | 03 | | | | 15,164 | | 15,164 | U |
| 30 | 0603801N | Innovative Naval Prototypes (INP) Advanced Technology Development | 03 | | | | 108,285 | | 108,285 | U |
| | | Advanced Technology Development | | | | | 686,342 | | 686,342 | |
| 31 | 0603207N | Air/Ocean Tactical Applications | 04 | | | | 48,365 | | 48,365 | U |
| 32 | 0603216N | Aviation Survivability | 04 | | | | 5,566 | | 5,566 | U |
| 33 | 0603251N | Aircraft Systems | 04 | | | | 695 | | 695 | U |
| 34 | 0603254N | ASW Systems Development | 04 | | | | 7,661 | | 7,661 | U |
| 35 | 0603261N | Tactical Airborne Reconnaissance | 04 | | | | 3,707 | | 3,707 | U |
| 36 | 0603382N | Advanced Combat Systems Technology | 04 | | | | 61,381 | | 61,381 | U |
| 37 | 0603502N | Surface and Shallow Water Mine Countermeasures | 04 | | | | 154,117 | | 154,117 | U |
| 38 | 0603506N | Surface Ship Torpedo Defense | 04 | | | | 14,974 | | 14,974 | U |
| 39 | 0603512N | Carrier Systems Development | 04 | | | | 9,296 | | 9,296 | U |
| 40 | 0603525N | PILOT FISH | 04 | | | | 132,083 | | 132,083 | U |
| 41 | 0603527N | RETRACT LARCH | 04 | | | | 37,407 | | 37,407 | U |
| 42 | 0603536N | RETRACT JUNIPER | 04 | | | | 122,413 | | 122,413 | U |
| 43 | 0603542N | Radiological Control | 04 | | | | 745 | | 745 | U |
| 44 | 0603553N | Surface ASW | 04 | | | | 1,136 | | 1,136 | U |
| 45 | 0603561N | Advanced Submarine System Development | 04 | | | | 100,955 | | 100,955 | U |

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Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2019 Base | FY 2019 OCO | FY 2019 Total | Sec |
|---|---|---|---|---|---|---|---|
| 29 | 0603782N | Mine and Expeditionary Warfare Advanced Technology | 03 | | | | U |
| 30 | 0603801N | Innovative Naval Prototypes (INP) Advanced Technology Development | 03 | 161,859 | | 161,859 | U |
| | | Advanced Technology Development | | 750,995 | | 750,995 | |
| 31 | 0603207N | Air/Ocean Tactical Applications | 04 | 29,747 | | 29,747 | U |
| 32 | 0603216N | Aviation Survivability | 04 | 7,050 | | 7,050 | U |
| 33 | 0603251N | Aircraft Systems | 04 | 793 | | 793 | U |
| 34 | 0603254N | ASW Systems Development | 04 | 7,058 | | 7,058 | U |
| 35 | 0603261N | Tactical Airborne Reconnaissance | 04 | 3,540 | | 3,540 | U |
| 36 | 0603382N | Advanced Combat Systems Technology | 04 | 59,741 | | 59,741 | U |
| 37 | 0603502N | Surface and Shallow Water Mine Countermeasures | 04 | 62,727 | | 62,727 | U |
| 38 | 0603506N | Surface Ship Torpedo Defense | 04 | 8,570 | | 8,570 | U |
| 39 | 0603512N | Carrier Systems Development | 04 | 5,440 | | 5,440 | U |
| 40 | 0603525N | PILOT FISH | 04 | 162,222 | | 162,222 | U |
| 41 | 0603527N | RETRACT LARCH | 04 | 11,745 | 18,000 | 29,745 | U |
| 42 | 0603536N | RETRACT JUNIPER | 04 | 114,265 | | 114,265 | U |
| 43 | 0603542N | Radiological Control | 04 | 740 | | 740 | U |
| 44 | 0603553N | Surface ASW | 04 | 1,122 | | 1,122 | U |
| 45 | 0603561N | Advanced Submarine System Development | 04 | 109,086 | | 109,086 | U |

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Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2017 (Base + OCO) | FY 2018 PB Request with CR Adj Base | FY 2018 Total PB Requests* with CR Adj Base | FY 2018 PB Request with CR Adj OCO | FY 2018 Total PB Requests+ with CR Adj OCO | Sec |
|---|---|---|---|---|---|---|---|---|---|
| 46 | 0603562N | Submarine Tactical Warfare Systems | 04 | 8,603 | 13,834 | 13,834 | | | U |
| 47 | 0603563N | Ship Concept Advanced Design | 04 | 14,359 | 36,891 | 36,891 | | | U |
| 48 | 0603564N | Ship Preliminary Design & Feasibility Studies | 04 | 13,451 | 12,012 | 12,012 | | | U |
| 49 | 0603570N | Advanced Nuclear Power Systems | 04 | 453,313 | 329,500 | 329,500 | | | U |
| 50 | 0603573N | Advanced Surface Machinery Systems | 04 | 30,255 | 29,953 | 29,953 | | | U |
| 51 | 0603576N | CHALK EAGLE | 04 | 353,146 | 191,610 | 191,610 | | | U |
| 52 | 0603581N | Littoral Combat Ship (LCS) | 04 | 50,806 | 40,991 | 40,991 | | | U |
| 53 | 0603582N | Combat System Integration | 04 | 23,839 | 24,674 | 24,674 | | | U |
| 54 | 0603595N | Ohio Replacement | 04 | 681,164 | 776,158 | 776,158 | | | U |
| 55 | 0603596N | LCS Mission Modules | 04 | 153,595 | 116,871 | 116,871 | | | U |
| 56 | 0603597N | Automated Test and Analysis | 04 | 14,507 | 8,052 | 8,052 | | | U |
| 57 | 0603599N | Frigate Development | 04 | 83,080 | 143,450 | 143,450 | | | U |
| 58 | 0603609N | Conventional Munitions | 04 | 8,342 | 8,909 | 8,909 | | | U |
| 59 | 0603611M | Marine Corps Assault Vehicles | 04 | 131,381 | | | | | U |
| 60 | 0603635M | Marine Corps Ground Combat/Support System | 04 | 1,043 | 1,428 | 1,428 | | | U |
| 61 | 0603654N | Joint Service Explosive Ordnance Development | 04 | 48,686 | 53,367 | 53,367 | | 29,700 | U |
| 62 | 0603713N | Ocean Engineering Technology Development | 04 | 4,639 | 8,212 | 8,212 | | | U |
| 63 | 0603721N | Environmental Protection | 04 | 19,117 | 20,214 | 20,214 | | | U |

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Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2018 Emergency Requests** | FY 2018 Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req Emergency | FY 2018 Total PB Requests* with CR Adj Base + OCO + Emergency** | FY 2018 Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req with CR Adj Base + OCO + Emergency | Sec |
|---|---|---|---|---|---|---|---|---|---|---|
| 46 | 0603562N | Submarine Tactical Warfare Systems | 04 | | | | 13,834 | | 13,834 | U |
| 47 | 0603563N | Ship Concept Advanced Design | 04 | | | | 36,891 | | 36,891 | U |
| 48 | 0603564N | Ship Preliminary Design & Feasibility Studies | 04 | | | | 12,012 | | 12,012 | U |
| 49 | 0603570N | Advanced Nuclear Power Systems | 04 | | | | 329,500 | | 329,500 | U |
| 50 | 0603573N | Advanced Surface Machinery Systems | 04 | | | | 29,953 | | 29,953 | U |
| 51 | 0603576N | CHALK EAGLE | 04 | | | | 191,610 | | 191,610 | U |
| 52 | 0603581N | Littoral Combat Ship (LCS) | 04 | | | | 40,991 | | 40,991 | U |
| 53 | 0603582N | Combat System Integration | 04 | | | | 24,674 | | 24,674 | U |
| 54 | 0603595N | Ohio Replacement | 04 | | | | 776,158 | | 776,158 | U |
| 55 | 0603596N | LCS Mission Modules | 04 | | | | 116,871 | | 116,871 | U |
| 56 | 0603597N | Automated Test and Analysis | 04 | | | | 8,052 | | 8,052 | U |
| 57 | 0603599N | Frigate Development | 04 | | | | 143,450 | | 143,450 | U |
| 58 | 0603609N | Conventional Munitions | 04 | | | | 8,909 | | 8,909 | U |
| 59 | 0603611M | Marine Corps Assault Vehicles | 04 | | | | | | | U |
| 60 | 0603635M | Marine Corps Ground Combat/Support System | 04 | | | | 1,428 | | 1,428 | U |
| 61 | 0603654N | Joint Service Explosive Ordnance Development | 04 | | | | 83,067 | | 83,067 | U |
| 62 | 0603713N | Ocean Engineering Technology Development | 04 | | | | 8,212 | | 8,212 | U |
| 63 | 0603721N | Environmental Protection | 04 | | | | 20,214 | | 20,214 | U |

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Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2019 Base | FY 2019 OCO | FY 2019 Total | Sec |
|---|---|---|---|---|---|---|---|
| 46 | 0603562N | Submarine Tactical Warfare Systems | 04 | 9,374 | | 9,374 | U |
| 47 | 0603563N | Ship Concept Advanced Design | 04 | 89,419 | | 89,419 | U |
| 48 | 0603564N | Ship Preliminary Design & Feasibility Studies | 04 | 13,348 | | 13,348 | U |
| 49 | 0603570N | Advanced Nuclear Power Systems | 04 | 256,137 | | 256,137 | U |
| 50 | 0603573N | Advanced Surface Machinery Systems | 04 | 22,109 | | 22,109 | U |
| 51 | 0603576N | CHALK EAGLE | 04 | 29,744 | | 29,744 | U |
| 52 | 0603581N | Littoral Combat Ship (LCS) | 04 | 27,997 | | 27,997 | U |
| 53 | 0603582N | Combat System Integration | 04 | 16,351 | | 16,351 | U |
| 54 | 0603595N | Ohio Replacement | 04 | 514,846 | | 514,846 | U |
| 55 | 0603596N | LCS Mission Modules | 04 | 103,633 | | 103,633 | U |
| 56 | 0603597N | Automated Test and Analysis | 04 | 7,931 | | 7,931 | U |
| 57 | 0603599N | Frigate Development | 04 | 134,772 | | 134,772 | U |
| 58 | 0603609N | Conventional Munitions | 04 | 9,307 | | 9,307 | U |
| 59 | 0603611M | Marine Corps Assault Vehicles | 04 | | | | U |
| 60 | 0603635M | Marine Corps Ground Combat/Support System | 04 | 1,828 | | 1,828 | U |
| 61 | 0603654N | Joint Service Explosive Ordnance Development | 04 | 43,148 | 13,900 | 57,048 | U |
| 62 | 0603713N | Ocean Engineering Technology Development | 04 | 5,915 | | 5,915 | U |
| 63 | 0603721N | Environmental Protection | 04 | 19,811 | | 19,811 | U |

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Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2017 (Base + OCO) | FY 2018 PB Request with CR Adj Base | FY 2018 Total PB Requests* with CR Adj Base | FY 2018 PB Request with CR Adj OCO | FY 2018 Total PB Requests+ with CR Adj OCO | Sec |
|---|---|---|---|---|---|---|---|---|---|
| 64 | 0603724N | Navy Energy Program | 04 | 69,500 | 50,623 | 25,623 | | | U |
| 65 | 0603725N | Facilities Improvement | 04 | 4,213 | 2,837 | 2,837 | | | U |
| 66 | 0603734N | CHALK CORAL | 04 | 225,665 | 245,143 | 245,143 | | | U |
| 67 | 0603739N | Navy Logistic Productivity | 04 | 2,973 | 2,995 | 2,995 | | | U |
| 68 | 0603746N | RETRACT MAPLE | 04 | 301,871 | 306,101 | 306,101 | | | U |
| 69 | 0603748N | LINK PLUMERIA | 04 | 259,756 | 253,675 | 253,675 | | | U |
| 70 | 0603751N | RETRACT ELM | 04 | 51,720 | 55,691 | 55,691 | | | U |
| 71 | 0603764N | LINK EVERGREEN | 04 | 46,282 | 48,982 | 48,982 | | | U |
| 72 | 0603787N | Special Processes | 04 | 13,088 | | | | | U |
| 73 | 0603790N | NATO Research and Development | 04 | 8,567 | 9,099 | 9,099 | | | U |
| 74 | 0603795N | Land Attack Technology | 04 | 17,260 | 33,568 | 33,568 | | 2,100 | U |
| 75 | 0603851M | Joint Non-Lethal Weapons Testing | 04 | 26,760 | 29,873 | 29,873 | | | U |
| 76 | 0603860N | Joint Precision Approach and Landing Systems - Dem/Val | 04 | 102,195 | 106,391 | 106,391 | | | U |
| 77 | 0603925N | Directed Energy and Electric Weapon Systems | 04 | 34,039 | 107,310 | 107,310 | | | U |
| 78 | 0604014N | F/A -18 Infrared Search and Track (IRST) | 04 | | | | | | U |
| 79 | 0604027N | Digital Warfare Office | 04 | | | | | | U |
| 80 | 0604028N | Small and Medium Unmanned Undersea Vehicles | 04 | | | | | | U |

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Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2018 Emergency Requests** Emergency | FY 2018 Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req Emergency | FY 2018 Total PB Requests* with CR Adj Base + OCO + Emergency** | FY 2018 Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req with CR Adj Base + OCO + Emergency | Sec |
|---|---|---|---|---|---|---|---|---|---|---|
| 64 | 0603724N | Navy Energy Program | 04 | | | | 25,623 | | 25,623 | U |
| 65 | 0603725N | Facilities Improvement | 04 | | | | 2,837 | | 2,837 | U |
| 66 | 0603734N | CHALK CORAL | 04 | | | | 245,143 | | 245,143 | U |
| 67 | 0603739N | Navy Logistic Productivity | 04 | | | | 2,995 | | 2,995 | U |
| 68 | 0603746N | RETRACT MAPLE | 04 | | | | 306,101 | | 306,101 | U |
| 69 | 0603748N | LINK PLUMERIA | 04 | | | | 253,675 | | 253,675 | U |
| 70 | 0603751N | RETRACT ELM | 04 | | | | 55,691 | | 55,691 | U |
| 71 | 0603764N | LINK EVERGREEN | 04 | | | | 48,982 | | 48,982 | U |
| 72 | 0603787N | Special Processes | 04 | | | | | | | U |
| 73 | 0603790N | NATO Research and Development | 04 | | | | 9,099 | | 9,099 | U |
| 74 | 0603795N | Land Attack Technology | 04 | | | | 35,668 | | 35,668 | U |
| 75 | 0603851M | Joint Non-Lethal Weapons Testing | 04 | | | | 29,873 | | 29,873 | U |
| 76 | 0603860N | Joint Precision Approach and Landing Systems - Dem/Val | 04 | | | | 106,391 | | 106,391 | U |
| 77 | 0603925N | Directed Energy and Electric Weapon Systems | 04 | | | | 107,310 | | 107,310 | U |
| 78 | 0604014N | F/A -18 Infrared Search and Track (IRST) | 04 | | | | | | | U |
| 79 | 0604027N | Digital Warfare Office | 04 | | | | | | | U |
| 80 | 0604028N | Small and Medium Unmanned Undersea Vehicles | 04 | | | | | | | U |

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Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2019 Base | FY 2019 OCO | FY 2019 Total | Sec |
|---|---|---|---|---|---|---|---|
| 64 | 0603724N | Navy Energy Program | 04 | 25,656 | | 25,656 | U |
| 65 | 0603725N | Facilities Improvement | 04 | 5,301 | | 5,301 | U |
| 66 | 0603734N | CHALK CORAL | 04 | 267,985 | | 267,985 | U |
| 67 | 0603739N | Navy Logistic Productivity | 04 | 4,059 | | 4,059 | U |
| 68 | 0603746N | RETRACT MAPLE | 04 | 377,878 | | 377,878 | U |
| 69 | 0603748N | LINK PLUMERIA | 04 | 381,770 | | 381,770 | U |
| 70 | 0603751N | RETRACT ELM | 04 | 60,535 | | 60,535 | U |
| 71 | 0603764N | LINK EVERGREEN | 04 | | | | U |
| 72 | 0603787N | Special Processes | 04 | | | | U |
| 73 | 0603790N | NATO Research and Development | 04 | 9,652 | | 9,652 | U |
| 74 | 0603795N | Land Attack Technology | 04 | 15,529 | 1,400 | 16,929 | U |
| 75 | 0603851M | Joint Non-Lethal Weapons Testing | 04 | 27,581 | | 27,581 | U |
| 76 | 0603860N | Joint Precision Approach and Landing Systems - Dem/Val | 04 | 101,566 | | 101,566 | U |
| 77 | 0603925N | Directed Energy and Electric Weapon Systems | 04 | 223,344 | | 223,344 | U |
| 78 | 0604014N | F/A -18 Infrared Search and Track (IRST) | 04 | 108,700 | | 108,700 | U |
| 79 | 0604027N | Digital Warfare Office | 04 | 26,691 | | 26,691 | U |
| 80 | 0604028N | Small and Medium Unmanned Undersea Vehicles | 04 | 16,717 | | 16,717 | U |

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Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2017 (Base + OCO) | FY 2018 PB Request with CR Adj Base | FY 2018 Total PB Requests* with CR Adj Base | FY 2018 PB Request with CR Adj OCO | FY 2018 Total PB Requests+ with CR Adj OCO | Sec |
|---|---|---|---|---|---|---|---|---|---|
| 81 | 0604029N | Unmanned Undersea Vehicle Core Technologies | 04 | | | | | | U |
| 82 | 0604030N | Rapid Prototyping, Experimentation and Demonstration. | 04 | | | | | | U |
| 83 | 0604031N | Large Unmanned Undersea Vehicles | 04 | | | | | | U |
| 84 | 0604112N | Gerald R. Ford Class Nuclear Aircraft Carrier (CVN 78 - 80) | 04 | 69,185 | 83,935 | 83,935 | | | U |
| 85 | 0604122N | Remote Minehunting System (RMS) | 04 | 2,926 | | | | | U |
| 86 | 0604126N | Littoral Airborne MCM | 04 | | | | | | U |
| 87 | 0604127N | Surface Mine Countermeasures | 04 | | | | | | U |
| 88 | 0604272N | Tactical Air Directional Infrared Countermeasures (TADIRCM) | 04 | 59,753 | 46,844 | 46,844 | 5,710 | 5,710 | U |
| 89 | 0604286M | Marine Corps Additive Manufacturing Technology Development | 04 | | 6,200 | 6,200 | | | U |
| 90 | 0604289M | Next Generation Logistics | 04 | | | | | | U |
| 91 | 0604292N | MH-XX | 04 | 1,618 | | | | | U |
| 92 | 0604320M | Rapid Technology Capability Prototype | 04 | | 7,055 | 7,055 | | | U |
| 93 | 0604454N | LX (R) | 04 | 24,730 | 9,578 | 9,578 | | | U |
| 94 | 0604536N | Advanced Undersea Prototyping | 04 | 57,363 | 66,543 | 66,543 | | | U |
| 95 | 0604659N | Precision Strike Weapons Development Program | 04 | 4,874 | 31,315 | 31,315 | | | U |
| 96 | 0604707N | Space and Electronic Warfare (SEW) Architecture/Engineering Support | 04 | 20,104 | 42,851 | 42,851 | | | U |

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Total Obligational Authority
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Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2018 Emergency Requests** Emergency | FY 2018 Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req Emergency | FY 2018 Total PB Requests* with CR Adj Base + OCO + Emergency** | FY 2018 Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req with CR Adj Base + OCO + Emergency | Sec |
|---|---|---|---|---|---|---|---|---|---|---|
| 81 | 0604029N | Unmanned Undersea Vehicle Core Technologies | 04 | | | | | | | U |
| 82 | 0604030N | Rapid Prototyping, Experimentation and Demonstration. | 04 | | | | | | | U |
| 83 | 0604031N | Large Unmanned Undersea Vehicles | 04 | | | | | | | U |
| 84 | 0604112N | Gerald R. Ford Class Nuclear Aircraft Carrier (CVN 78 - 80) | 04 | | | | 83,935 | | 83,935 | U |
| 85 | 0604122N | Remote Minehunting System (RMS) | 04 | | | | | | | U |
| 86 | 0604126N | Littoral Airborne MCM | 04 | | | | | | | U |
| 87 | 0604127N | Surface Mine Countermeasures | 04 | | | | | | | U |
| 88 | 0604272N | Tactical Air Directional Infrared Countermeasures (TADIRCM) | 04 | | | | 52,554 | | 52,554 | U |
| 89 | 0604286M | Marine Corps Additive Manufacturing Technology Development | 04 | | | | 6,200 | | 6,200 | U |
| 90 | 0604289M | Next Generation Logistics | 04 | | | | | | | U |
| 91 | 0604292N | MH-XX | 04 | | | | | | | U |
| 92 | 0604320M | Rapid Technology Capability Prototype | 04 | | | | 7,055 | | 7,055 | U |
| 93 | 0604454N | LX (R) | 04 | | | | 9,578 | | 9,578 | U |
| 94 | 0604536N | Advanced Undersea Prototyping | 04 | | | | 66,543 | | 66,543 | U |
| 95 | 0604659N | Precision Strike Weapons Development Program | 04 | | | | 31,315 | | 31,315 | U |
| 96 | 0604707N | Space and Electronic Warfare (SEW) Architecture/Engineering Support | 04 | | | | 42,851 | | 42,851 | U |

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Total Obligational Authority
(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2019 Base | FY 2019 OCO | FY 2019 Total | Sec |
|---|---|---|---|---|---|---|---|
| 81 | 0604029N | Unmanned Undersea Vehicle Core Technologies | 04 | 30,187 | | 30,187 | U |
| 82 | 0604030N | Rapid Prototyping, Experimentation and Demonstration. | 04 | 48,796 | | 48,796 | U |
| 83 | 0604031N | Large Unmanned Undersea Vehicles | 04 | 92,613 | | 92,613 | U |
| 84 | 0604112N | Gerald R. Ford Class Nuclear Aircraft Carrier (CVN 78 - 80) | 04 | 58,121 | | 58,121 | U |
| 85 | 0604122N | Remote Minehunting System (RMS) | 04 | | | | U |
| 86 | 0604126N | Littoral Airborne MCM | 04 | 17,622 | | 17,622 | U |
| 87 | 0604127N | Surface Mine Countermeasures | 04 | 18,154 | | 18,154 | U |
| 88 | 0604272N | Tactical Air Directional Infrared Countermeasures (TADIRCM) | 04 | 47,278 | | 47,278 | U |
| 89 | 0604286M | Marine Corps Additive Manufacturing Technology Development | 04 | | | | U |
| 90 | 0604289M | Next Generation Logistics | 04 | 11,081 | | 11,081 | U |
| 91 | 0604292N | MH-XX | 04 | | | | U |
| 92 | 0604320M | Rapid Technology Capability Prototype | 04 | 7,107 | | 7,107 | U |
| 93 | 0604454N | LX (R) | 04 | 5,549 | | 5,549 | U |
| 94 | 0604536N | Advanced Undersea Prototyping | 04 | 87,669 | | 87,669 | U |
| 95 | 0604659N | Precision Strike Weapons Development Program | 04 | 132,818 | | 132,818 | U |
| 96 | 0604707N | Space and Electronic Warfare (SEW) Architecture/Engineering Support | 04 | 7,230 | | 7,230 | U |

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Exhibit R-1 FY 2019 President's Budget
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(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2017 (Base + OCO) | FY 2018 PB Request with CR Adj Base | FY 2018 Total PB Requests* with CR Adj Base | FY 2018 PB Request with CR Adj OCO | FY 2018 Total PB Requests+ with CR Adj OCO | Sec |
|---|---|---|---|---|---|---|---|---|---|
| 97 | 0604786N | Offensive Anti-Surface Warfare Weapon Development | 04 | 301,554 | 160,694 | 160,694 | | | U |
| 98 | 0605812M | Joint Light Tactical Vehicle (JLTV) Engineering and Manufacturing Development Ph | 04 | 7,658 | | | | | U |
| 99 | 0303354N | ASW Systems Development - MIP | 04 | 9,110 | 8,278 | 8,278 | | | U |
| 100 | 0304240M | Advanced Tactical Unmanned Aircraft System | 04 | | 7,979 | 7,979 | | | U |
| 101 | 0304240N | Advanced Tactical Unmanned Aircraft System | 04 | | | | | | U |
| 102 | 0304270N | Electronic Warfare Development - MIP | 04 | 437 | 527 | 527 | | | U |
| | | Advanced Component Development & Prototypes | | 4,510,800 | 4,218,714 | 4,193,714 | 27,710 | 59,510 | |
| 103 | 0603208N | Training System Aircraft | 05 | 17,490 | 16,945 | 16,945 | | | U |
| 104 | 0604212N | Other Helo Development | 05 | 5,889 | 26,786 | 26,786 | | | U |
| 105 | 0604214M | AV-8B Aircraft - Eng Dev | 05 | | | | | | U |
| 106 | 0604214N | AV-8B Aircraft - Eng Dev | 05 | 32,179 | 48,780 | 48,780 | | | U |
| 107 | 0604215N | Standards Development | 05 | 1,300 | 2,722 | 2,722 | | | U |
| 108 | 0604216N | Multi-Mission Helicopter Upgrade Development | 05 | 5,189 | 5,371 | 5,371 | | | U |
| 109 | 0604218N | Air/Ocean Equipment Engineering | 05 | 3,747 | 782 | 782 | | | U |
| 110 | 0604221N | P-3 Modernization Program | 05 | 1,864 | 1,361 | 1,361 | | | U |
| 111 | 0604230N | Warfare Support System | 05 | 11,404 | 14,167 | 14,167 | | 5,400 | U |
| 112 | 0604231N | Tactical Command System | 05 | 36,190 | 55,695 | 55,695 | | | U |

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(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2018 Emergency Requests** | FY 2018 Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req Emergency | FY 2018 Total PB Requests* with CR Adj Base + OCO + Emergency** | FY 2018 Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req with CR Adj Base + OCO + Emergency | Sec |
|---|---|---|---|---|---|---|---|---|---|---|
| 97 | 0604786N | Offensive Anti-Surface Warfare Weapon Development | 04 | | | | 160,694 | | 160,694 | U |
| 98 | 0605812M | Joint Light Tactical Vehicle (JLTV) Engineering and Manufacturing Development Ph | 04 | | | | | | | U |
| 99 | 0303354N | ASW Systems Development - MIP | 04 | | | | 8,278 | | 8,278 | U |
| 100 | 0304240M | Advanced Tactical Unmanned Aircraft System | 04 | | | | 7,979 | | 7,979 | U |
| 101 | 0304240N | Advanced Tactical Unmanned Aircraft System | 04 | | | | | | | U |
| 102 | 0304270N | Electronic Warfare Development - MIP | 04 | | | | 527 | | 527 | U |
| | | Advanced Component Development & Prototypes | | | | | 4,253,224 | | 4,253,224 | |
| 103 | 0603208N | Training System Aircraft | 05 | | | | 16,945 | | 16,945 | U |
| 104 | 0604212N | Other Helo Development | 05 | | | | 26,786 | | 26,786 | U |
| 105 | 0604214M | AV-8B Aircraft - Eng Dev | 05 | | | | | | | U |
| 106 | 0604214N | AV-8B Aircraft - Eng Dev | 05 | | | | 48,780 | | 48,780 | U |
| 107 | 0604215N | Standards Development | 05 | | | | 2,722 | | 2,722 | U |
| 108 | 0604216N | Multi-Mission Helicopter Upgrade Development | 05 | | | | 5,371 | | 5,371 | U |
| 109 | 0604218N | Air/Ocean Equipment Engineering | 05 | | | | 782 | | 782 | U |
| 110 | 0604221N | P-3 Modernization Program | 05 | | | | 1,361 | | 1,361 | U |
| 111 | 0604230N | Warfare Support System | 05 | | | | 19,567 | | 19,567 | U |
| 112 | 0604231N | Tactical Command System | 05 | | | | 55,695 | | 55,695 | U |

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Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2019 Base | FY 2019 OCO | FY 2019 Total | Sec |
|---|---|---|---|---|---|---|---|
| 97 | 0604786N | Offensive Anti-Surface Warfare Weapon Development | 04 | 143,062 | | 143,062 | U |
| 98 | 0605812M | Joint Light Tactical Vehicle (JLTV) Engineering and Manufacturing Development Ph | 04 | | | | U |
| 99 | 0303354N | ASW Systems Development - MIP | 04 | 8,889 | | 8,889 | U |
| 100 | 0304240M | Advanced Tactical Unmanned Aircraft System | 04 | 25,291 | | 25,291 | U |
| 101 | 0304240N | Advanced Tactical Unmanned Aircraft System | 04 | 9,300 | | 9,300 | U |
| 102 | 0304270N | Electronic Warfare Development - MIP | 04 | 466 | | 466 | U |
| | | Advanced Component Development & Prototypes | | 4,293,713 | 33,300 | 4,327,013 | |
| 103 | 0603208N | Training System Aircraft | 05 | 12,798 | | 12,798 | U |
| 104 | 0604212N | Other Helo Development | 05 | 32,128 | | 32,128 | U |
| 105 | 0604214M | AV-8B Aircraft - Eng Dev | 05 | 46,363 | | 46,363 | U |
| 106 | 0604214N | AV-8B Aircraft - Eng Dev | 05 | | | | U |
| 107 | 0604215N | Standards Development | 05 | 3,771 | | 3,771 | U |
| 108 | 0604216N | Multi-Mission Helicopter Upgrade Development | 05 | 16,611 | | 16,611 | U |
| 109 | 0604218N | Air/Ocean Equipment Engineering | 05 | 17,368 | | 17,368 | U |
| 110 | 0604221N | P-3 Modernization Program | 05 | 2,134 | | 2,134 | U |
| 111 | 0604230N | Warfare Support System | 05 | 9,729 | | 9,729 | U |
| 112 | 0604231N | Tactical Command System | 05 | 57,688 | | 57,688 | U |

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(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2017 (Base + OCO) | FY 2018 PB Request with CR Adj Base | FY 2018 Total PB Requests* with CR Adj Base | FY 2018 PB Request with CR Adj OCO | FY 2018 Total PB Requests+ with CR Adj OCO | Sec |
|---|---|---|---|---|---|---|---|---|---|
| 113 | 0604234N | Advanced Hawkeye | 05 | 354,390 | 292,535 | 292,535 | | | U |
| 114 | 0604245M | H-1 Upgrades | 05 | | | | | | U |
| 115 | 0604245N | H-1 Upgrades | 05 | 27,013 | 61,288 | 61,288 | | | U |
| 116 | 0604261N | Acoustic Search Sensors | 05 | 28,940 | 37,167 | 37,167 | | | U |
| 117 | 0604262N | V-22A | 05 | 149,113 | 171,386 | 171,386 | | | U |
| 118 | 0604264N | Air Crew Systems Development | 05 | 8,746 | 13,235 | 13,235 | | | U |
| 119 | 0604269N | EA-18 | 05 | 100,825 | 173,488 | 173,488 | | | U |
| 120 | 0604270N | Electronic Warfare Development | 05 | 44,894 | 54,055 | 54,055 | | | U |
| 121 | 0604273M | Executive Helo Development | 05 | | | | | | U |
| 122 | 0604273N | Executive Helo Development | 05 | 327,770 | 451,938 | 451,938 | | | U |
| 123 | 0604274N | Next Generation Jammer (NGJ) | 05 | 559,017 | 632,936 | 632,936 | | | U |
| 124 | 0604280N | Joint Tactical Radio System - Navy (JTRS-Navy) | 05 | 2,295 | 4,310 | 4,310 | | | U |
| 125 | 0604282N | Next Generation Jammer (NGJ) Increment II | 05 | 18,964 | 66,686 | 66,686 | | | U |
| 126 | 0604307N | Surface Combatant Combat System Engineering | 05 | 288,678 | 390,238 | 390,238 | | | U |
| 127 | 0604311N | LPD-17 Class Systems Integration | 05 | 565 | 689 | 689 | | | U |
| 128 | 0604329N | Small Diameter Bomb (SDB) | 05 | 86,989 | 112,846 | 112,846 | | | U |
| 129 | 0604366N | Standard Missile Improvements | 05 | 113,601 | 158,578 | 158,578 | | | U |
| 130 | 0604373N | Airborne MCM | 05 | 44,930 | 15,734 | 15,734 | | | U |

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(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2018 Emergency Requests** | FY 2018 Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req Emergency | FY 2018 Total PB Requests* with CR Adj Base + OCO + Emergency** | FY 2018 Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req with CR Adj Base + OCO + Emergency | Sec |
|---|---|---|---|---|---|---|---|---|---|---|
| 113 | 0604234N | Advanced Hawkeye | 05 | | | | 292,535 | | 292,535 | U |
| 114 | 0604245M | H-1 Upgrades | 05 | | | | | | | U |
| 115 | 0604245N | H-1 Upgrades | 05 | | | | 61,288 | | 61,288 | U |
| 116 | 0604261N | Acoustic Search Sensors | 05 | | | | 37,167 | | 37,167 | U |
| 117 | 0604262N | V-22A | 05 | | | | 171,386 | | 171,386 | U |
| 118 | 0604264N | Air Crew Systems Development | 05 | | | | 13,235 | | 13,235 | U |
| 119 | 0604269N | EA-18 | 05 | | | | 173,488 | | 173,488 | U |
| 120 | 0604270N | Electronic Warfare Development | 05 | | | | 54,055 | | 54,055 | U |
| 121 | 0604273M | Executive Helo Development | 05 | | | | | | | U |
| 122 | 0604273N | Executive Helo Development | 05 | | | | 451,938 | | 451,938 | U |
| 123 | 0604274N | Next Generation Jammer (NGJ) | 05 | | | | 632,936 | | 632,936 | U |
| 124 | 0604280N | Joint Tactical Radio System - Navy (JTRS-Navy) | 05 | | | | 4,310 | | 4,310 | U |
| 125 | 0604282N | Next Generation Jammer (NGJ) Increment II | 05 | | | | 66,686 | | 66,686 | U |
| 126 | 0604307N | Surface Combatant Combat System Engineering | 05 | | | | 390,238 | | 390,238 | U |
| 127 | 0604311N | LPD-17 Class Systems Integration | 05 | | | | 689 | | 689 | U |
| 128 | 0604329N | Small Diameter Bomb (SDB) | 05 | | | | 112,846 | | 112,846 | U |
| 129 | 0604366N | Standard Missile Improvements | 05 | | | | 158,578 | | 158,578 | U |
| 130 | 0604373N | Airborne MCM | 05 | | | | 15,734 | | 15,734 | U |

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(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2019 Base | FY 2019 OCO | FY 2019 Total | Sec |
|---|---|---|---|---|---|---|---|
| 113 | 0604234N | Advanced Hawkeye | 05 | 223,565 | | 223,565 | U |
| 114 | 0604245M | H-1 Upgrades | 05 | 58,097 | | 58,097 | U |
| 115 | 0604245N | H-1 Upgrades | 05 | | | | U |
| 116 | 0604261N | Acoustic Search Sensors | 05 | 42,485 | | 42,485 | U |
| 117 | 0604262N | V-22A | 05 | 143,079 | | 143,079 | U |
| 118 | 0604264N | Air Crew Systems Development | 05 | 20,980 | | 20,980 | U |
| 119 | 0604269N | EA-18 | 05 | 147,419 | | 147,419 | U |
| 120 | 0604270N | Electronic Warfare Development | 05 | 89,824 | | 89,824 | U |
| 121 | 0604273M | Executive Helo Development | 05 | 245,064 | | 245,064 | U |
| 122 | 0604273N | Executive Helo Development | 05 | | | | U |
| 123 | 0604274N | Next Generation Jammer (NGJ) | 05 | 459,529 | | 459,529 | U |
| 124 | 0604280N | Joint Tactical Radio System - Navy (JTRS-Navy) | 05 | 3,272 | | 3,272 | U |
| 125 | 0604282N | Next Generation Jammer (NGJ) Increment II | 05 | 115,253 | | 115,253 | U |
| 126 | 0604307N | Surface Combatant Combat System Engineering | 05 | 397,403 | | 397,403 | U |
| 127 | 0604311N | LPD-17 Class Systems Integration | 05 | 939 | | 939 | U |
| 128 | 0604329N | Small Diameter Bomb (SDB) | 05 | 104,448 | | 104,448 | U |
| 129 | 0604366N | Standard Missile Improvements | 05 | 165,881 | | 165,881 | U |
| 130 | 0604373N | Airborne MCM | 05 | 10,831 | | 10,831 | U |

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(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2017 (Base + OCO) | FY 2018 PB Request with CR Adj Base | FY 2018 Total PB Requests* with CR Adj Base | FY 2018 PB Request with CR Adj OCO | FY 2018 Total PB Requests+ with CR Adj OCO | Sec |
|---|---|---|---|---|---|---|---|---|---|
| 131 | 0604378N | Naval Integrated Fire Control - Counter Air Systems Engineering | 05 | 25,086 | 25,445 | 25,445 | | | U |
| 132 | 0604501N | Advanced Above Water Sensors | 05 | 70,658 | 87,233 | 87,233 | | | U |
| 133 | 0604503N | SSN-688 and Trident Modernization | 05 | 120,261 | 130,981 | 130,981 | | | U |
| 134 | 0604504N | Air Control | 05 | 42,206 | 75,186 | 75,186 | | | U |
| 135 | 0604512N | Shipboard Aviation Systems | 05 | 114,327 | 177,926 | 177,926 | | | U |
| 136 | 0604518N | Combat Information Center Conversion | 05 | 6,092 | 8,062 | 8,062 | | | U |
| 137 | 0604522N | Air and Missile Defense Radar (AMDR) System | 05 | 141,338 | 32,090 | 32,090 | | | U |
| 138 | 0604530N | Advanced Arresting Gear (AAG) | 05 | | | | | | U |
| 139 | 0604558N | New Design SSN | 05 | 127,883 | 120,087 | 120,087 | | | U |
| 140 | 0604562N | Submarine Tactical Warfare System | 05 | 50,069 | 50,850 | 50,850 | | | U |
| 141 | 0604567N | Ship Contract Design/ Live Fire T&E | 05 | 82,946 | 67,166 | 67,166 | | | U |
| 142 | 0604574N | Navy Tactical Computer Resources | 05 | 3,059 | 4,817 | 4,817 | | | U |
| 143 | 0604580N | Virginia Payload Module (VPM) | 05 | 94,846 | 72,861 | 72,861 | | | U |
| 144 | 0604601N | Mine Development | 05 | 14,860 | 25,635 | 25,635 | | | U |
| 145 | 0604610N | Lightweight Torpedo Development | 05 | 29,567 | 28,076 | 28,076 | | | U |
| 146 | 0604654N | Joint Service Explosive Ordnance Development | 05 | 7,369 | 7,561 | 7,561 | | | U |
| 147 | 0604703N | Personnel, Training, Simulation, and Human Factors | 05 | 4,805 | 40,828 | 40,828 | | | U |
| 148 | 0604727N | Joint Standoff Weapon Systems | 05 | 396 | 435 | 435 | | | U |

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(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2018 Emergency Requests** | FY 2018 Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req Emergency | FY 2018 Total PB Requests* with CR Adj Base + OCO + Emergency** | FY 2018 Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req with CR Adj Base + OCO + Emergency | Sec |
|---|---|---|---|---|---|---|---|---|---|---|
| 131 | 0604378N | Naval Integrated Fire Control - Counter Air Systems Engineering | 05 | | | | 25,445 | | 25,445 | U |
| 132 | 0604501N | Advanced Above Water Sensors | 05 | | | | 87,233 | | 87,233 | U |
| 133 | 0604503N | SSN-688 and Trident Modernization | 05 | | | | 130,981 | | 130,981 | U |
| 134 | 0604504N | Air Control | 05 | | | | 75,186 | | 75,186 | U |
| 135 | 0604512N | Shipboard Aviation Systems | 05 | | | | 177,926 | | 177,926 | U |
| 136 | 0604518N | Combat Information Center Conversion | 05 | | | | 8,062 | | 8,062 | U |
| 137 | 0604522N | Air and Missile Defense Radar (AMDR) System | 05 | | | | 32,090 | | 32,090 | U |
| 138 | 0604530N | Advanced Arresting Gear (AAG) | 05 | | | | | | | U |
| 139 | 0604558N | New Design SSN | 05 | | | | 120,087 | | 120,087 | U |
| 140 | 0604562N | Submarine Tactical Warfare System | 05 | | | | 50,850 | | 50,850 | U |
| 141 | 0604567N | Ship Contract Design/ Live Fire T&E | 05 | | | | 67,166 | | 67,166 | U |
| 142 | 0604574N | Navy Tactical Computer Resources | 05 | | | | 4,817 | | 4,817 | U |
| 143 | 0604580N | Virginia Payload Module (VPM) | 05 | | | | 72,861 | | 72,861 | U |
| 144 | 0604601N | Mine Development | 05 | | | | 25,635 | | 25,635 | U |
| 145 | 0604610N | Lightweight Torpedo Development | 05 | | | | 28,076 | | 28,076 | U |
| 146 | 0604654N | Joint Service Explosive Ordnance Development | 05 | | | | 7,561 | | 7,561 | U |
| 147 | 0604703N | Personnel, Training, Simulation, and Human Factors | 05 | | | | 40,828 | | 40,828 | U |
| 148 | 0604727N | Joint Standoff Weapon Systems | 05 | | | | 435 | | 435 | U |

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(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2019 Base | FY 2019 OCO | FY 2019 Total | Sec |
|---|---|---|---|---|---|---|---|
| 131 | 0604378N | Naval Integrated Fire Control - Counter Air Systems Engineering | 05 | 33,429 | | 33,429 | U |
| 132 | 0604501N | Advanced Above Water Sensors | 05 | 35,635 | | 35,635 | U |
| 133 | 0604503N | SSN-688 and Trident Modernization | 05 | 126,932 | | 126,932 | U |
| 134 | 0604504N | Air Control | 05 | 62,448 | | 62,448 | U |
| 135 | 0604512N | Shipboard Aviation Systems | 05 | 9,710 | | 9,710 | U |
| 136 | 0604518N | Combat Information Center Conversion | 05 | 19,303 | | 19,303 | U |
| 137 | 0604522N | Air and Missile Defense Radar (AMDR) System | 05 | 27,059 | | 27,059 | U |
| 138 | 0604530N | Advanced Arresting Gear (AAG) | 05 | 184,106 | | 184,106 | U |
| 139 | 0604558N | New Design SSN | 05 | 148,233 | | 148,233 | U |
| 140 | 0604562N | Submarine Tactical Warfare System | 05 | 60,824 | | 60,824 | U |
| 141 | 0604567N | Ship Contract Design/ Live Fire T&E | 05 | 60,062 | | 60,062 | U |
| 142 | 0604574N | Navy Tactical Computer Resources | 05 | 4,642 | | 4,642 | U |
| 143 | 0604580N | Virginia Payload Module (VPM) | 05 | | | | U |
| 144 | 0604601N | Mine Development | 05 | 25,756 | | 25,756 | U |
| 145 | 0604610N | Lightweight Torpedo Development | 05 | 95,147 | | 95,147 | U |
| 146 | 0604654N | Joint Service Explosive Ordnance Development | 05 | 7,107 | | 7,107 | U |
| 147 | 0604703N | Personnel, Training, Simulation, and Human Factors | 05 | 6,539 | | 6,539 | U |
| 148 | 0604727N | Joint Standoff Weapon Systems | 05 | 441 | | 441 | U |

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(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2017 (Base + OCO) | FY 2018 PB Request with CR Adj Base | FY 2018 Total PB Requests* with CR Adj Base | FY 2018 PB Request with CR Adj OCO | FY 2018 Total PB Requests+ with CR Adj OCO | Sec |
|---|---|---|---|---|---|---|---|---|---|
| 149 | 0604755N | Ship Self Defense (Detect & Control) | 05 | 133,452 | 161,713 | 161,713 | | | U |
| 150 | 0604756N | Ship Self Defense (Engage: Hard Kill) | 05 | 115,081 | 212,412 | 212,412 | | | U |
| 151 | 0604757N | Ship Self Defense (Engage: Soft Kill/EW) | 05 | 108,630 | 103,391 | 103,391 | | | U |
| 152 | 0604761N | Intelligence Engineering | 05 | 9,029 | 34,855 | 34,855 | | | U |
| 153 | 0604771N | Medical Development | 05 | 24,510 | 9,353 | 9,353 | | | U |
| 154 | 0604777N | Navigation/ID System | 05 | 41,905 | 92,546 | 92,546 | | | U |
| 155 | 0604800M | Joint Strike Fighter (JSF) - EMD | 05 | 519,393 | 152,934 | 152,934 | | | U |
| 156 | 0604800N | Joint Strike Fighter (JSF) - EMD | 05 | 512,662 | 108,931 | 108,931 | | | U |
| 157 | 0604810M | Joint Strike Fighter Follow On Modernization (FoM) - Marine Corps | 05 | 29,691 | 144,958 | 144,958 | | | U |
| 158 | 0604810N | Joint Strike Fighter Follow On Modernization (FoM) - Navy | 05 | 25,041 | 143,855 | 143,855 | | | U |
| 159 | 0605013M | Information Technology Development | 05 | 3,744 | 14,865 | 14,865 | | | U |
| 160 | 0605013N | Information Technology Development | 05 | 87,469 | 152,977 | 152,977 | | | U |
| 161 | 0605024N | Anti-Tamper Technology Support | 05 | 500 | 3,410 | 3,410 | | | U |
| 162 | 0605212M | CH-53K RDTE | 05 | | | | | | U |
| 163 | 0605212N | CH-53K RDTE | 05 | 339,101 | 340,758 | 340,758 | | | U |
| 164 | 0605215N | Mission Planning | 05 | 32,876 | 33,430 | 33,430 | | | U |
| 165 | 0605217N | Common Avionics | 05 | 42,711 | 58,163 | 58,163 | | | U |
| 166 | 0605220N | Ship to Shore Connector (SSC) | 05 | 12,588 | 22,410 | 22,410 | | | U |

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Total Obligational Authority
(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2018 Emergency Requests** | FY 2018 Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req Emergency | FY 2018 Total PB Requests* with CR Adj Base + OCO + Emergency** | FY 2018 Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req with CR Adj Base + OCO + Emergency | Sec |
|---|---|---|---|---|---|---|---|---|---|---|
| 149 | 0604755N | Ship Self Defense (Detect & Control) | 05 | | | | 161,713 | | 161,713 | U |
| 150 | 0604756N | Ship Self Defense (Engage: Hard Kill) | 05 | | | | 212,412 | | 212,412 | U |
| 151 | 0604757N | Ship Self Defense (Engage: Soft Kill/EW) | 05 | | | | 103,391 | | 103,391 | U |
| 152 | 0604761N | Intelligence Engineering | 05 | | | | 34,855 | | 34,855 | U |
| 153 | 0604771N | Medical Development | 05 | | | | 9,353 | | 9,353 | U |
| 154 | 0604777N | Navigation/ID System | 05 | | | | 92,546 | | 92,546 | U |
| 155 | 0604800M | Joint Strike Fighter (JSF) - EMD | 05 | | | | 152,934 | | 152,934 | U |
| 156 | 0604800N | Joint Strike Fighter (JSF) - EMD | 05 | | | | 108,931 | | 108,931 | U |
| 157 | 0604810M | Joint Strike Fighter Follow On Modernization (FoM) - Marine Corps | 05 | | | | 144,958 | | 144,958 | U |
| 158 | 0604810N | Joint Strike Fighter Follow On Modernization (FoM) - Navy | 05 | | | | 143,855 | | 143,855 | U |
| 159 | 0605013M | Information Technology Development | 05 | | | | 14,865 | | 14,865 | U |
| 160 | 0605013N | Information Technology Development | 05 | | | | 152,977 | | 152,977 | U |
| 161 | 0605024N | Anti-Tamper Technology Support | 05 | | | | 3,410 | | 3,410 | U |
| 162 | 0605212M | CH-53K RDTE | 05 | | | | | | | U |
| 163 | 0605212N | CH-53K RDTE | 05 | | | | 340,758 | | 340,758 | U |
| 164 | 0605215N | Mission Planning | 05 | | | | 33,430 | | 33,430 | U |
| 165 | 0605217N | Common Avionics | 05 | | | | 58,163 | | 58,163 | U |
| 166 | 0605220N | Ship to Shore Connector (SSC) | 05 | | | | 22,410 | | 22,410 | U |

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Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2019 Base | FY 2019 OCO | FY 2019 Total | Sec |
|---|---|---|---|---|---|---|---|
| 149 | 0604755N | Ship Self Defense (Detect & Control) | 05 | 180,391 | 1,100 | 181,491 | U |
| 150 | 0604756N | Ship Self Defense (Engage: Hard Kill) | 05 | 178,538 | | 178,538 | U |
| 151 | 0604757N | Ship Self Defense (Engage: Soft Kill/EW) | 05 | 120,507 | | 120,507 | U |
| 152 | 0604761N | Intelligence Engineering | 05 | 29,715 | | 29,715 | U |
| 153 | 0604771N | Medical Development | 05 | 8,095 | | 8,095 | U |
| 154 | 0604777N | Navigation/ID System | 05 | 121,026 | | 121,026 | U |
| 155 | 0604800M | Joint Strike Fighter (JSF) - EMD | 05 | 66,566 | | 66,566 | U |
| 156 | 0604800N | Joint Strike Fighter (JSF) - EMD | 05 | 65,494 | | 65,494 | U |
| 157 | 0604810M | Joint Strike Fighter Follow On Modernization (FoM) - Marine Corps | 05 | | | | U |
| 158 | 0604810N | Joint Strike Fighter Follow On Modernization (FoM) - Navy | 05 | | | | U |
| 159 | 0605013M | Information Technology Development | 05 | 14,005 | | 14,005 | U |
| 160 | 0605013N | Information Technology Development | 05 | 268,567 | | 268,567 | U |
| 161 | 0605024N | Anti-Tamper Technology Support | 05 | 5,618 | | 5,618 | U |
| 162 | 0605212M | CH-53K RDTE | 05 | 326,945 | | 326,945 | U |
| 163 | 0605212N | CH-53K RDTE | 05 | | | | U |
| 164 | 0605215N | Mission Planning | 05 | 32,714 | | 32,714 | U |
| 165 | 0605217N | Common Avionics | 05 | 51,486 | | 51,486 | U |
| 166 | 0605220N | Ship to Shore Connector (SSC) | 05 | 1,444 | | 1,444 | U |

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Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2017 (Base + OCO) | FY 2018 PB Request with CR Adj Base | FY 2018 Total PB Requests* with CR Adj Base | FY 2018 PB Request with CR Adj OCO | FY 2018 Total PB Requests+ with CR Adj OCO | Sec |
|---|---|---|---|---|---|---|---|---|---|
| 167 | 0605327N | T-AO 205 Class | 05 | 1,062 | 1,961 | 1,961 | | | U |
| 168 | 0605414N | Unmanned Carrier Aviation (UCA) | 05 | 75,863 | 222,208 | 222,208 | | | U |
| 169 | 0605450M | Joint Air-to-Ground Missile (JAGM) | 05 | | | | | | U |
| 170 | 0605450N | Joint Air-to-Ground Missile (JAGM) | 05 | 17,834 | 15,473 | 15,473 | | | U |
| 171 | 0605500N | Multi-mission Maritime Aircraft (MMA) | 05 | 61,959 | 11,795 | 11,795 | | | U |
| 172 | 0605504N | Multi-Mission Maritime (MMA) Increment III | 05 | 109,827 | 181,731 | 181,731 | | | U |
| 173 | 0605611M | Marine Corps Assault Vehicles System Development & Demonstration | 05 | | 178,993 | 178,993 | | | U |
| 174 | 0605813M | Joint Light Tactical Vehicle (JLTV) System Development & Demonstration | 05 | | 20,710 | 20,710 | | | U |
| 175 | 0204202N | DDG-1000 | 05 | 45,187 | 140,500 | 140,500 | | | U |
| 176 | 0303267N | Auctioned Spectrum Relocation Fund*** | 05 | 251,203 | | | | | U |
| 177 | 0303367N | Spectrum Access Research and Development*** | 05 | 46,902 | | | | | U |
| 178 | 0303467N | SENSR Spectrum Pipeline SRF*** | 05 | 150 | | | | | U |
| 179 | 0304231N | Tactical Command System - MIP | 05 | 676 | | | | | U |
| 180 | 0304785N | Tactical Cryptologic Systems | 05 | 34,038 | 28,311 | 28,311 | | | U |
| 181 | 0305124N | Special Applications Program | 05 | 35,002 | | | | | U |
| 182 | 0306250M | Cyber Operations Technology Development | 05 | 2,349 | 4,502 | 4,502 | | | U |
| | | System Development & Demonstration | | 5,928,185 | 6,362,102 | 6,362,102 | | 5,400 | |

***Funding in this Program Element was transferred during the year of execution from the Spectrum Relocation Fund (SRF) in support of the Advanced Wireless Services 3 (AWS-3) auction and is associated with the reallocation or sharing of the 1755-1780 MHz and 1695-1710 MHz bands. The SRF is administered by the Office of Management and Budget (OMB), which approves SRF transfers to federal agencies on an annual basis in consultation with the National Telecommunications and Information Administration (NTIA).

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(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2018 Emergency Requests** Emergency | FY 2018 Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req Emergency | FY 2018 Total PB Requests* with CR Adj Base + OCO + Emergency** | FY 2018 Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req with CR Adj Base + OCO + Emergency | Sec |
|---|---|---|---|---|---|---|---|---|---|---|
| 167 | 0605327N | T-AO 205 Class | 05 | | | | 1,961 | | 1,961 | U |
| 168 | 0605414N | Unmanned Carrier Aviation (UCA) | 05 | | | | 222,208 | | 222,208 | U |
| 169 | 0605450M | Joint Air-to-Ground Missile (JAGM) | 05 | | | | | | | U |
| 170 | 0605450N | Joint Air-to-Ground Missile (JAGM) | 05 | | | | 15,473 | | 15,473 | U |
| 171 | 0605500N | Multi-mission Maritime Aircraft (MMA) | 05 | | | | 11,795 | | 11,795 | U |
| 172 | 0605504N | Multi-Mission Maritime (MMA) Increment III | 05 | | | | 181,731 | | 181,731 | U |
| 173 | 0605611M | Marine Corps Assault Vehicles System Development & Demonstration | 05 | | | | 178,993 | | 178,993 | U |
| 174 | 0605813M | Joint Light Tactical Vehicle (JLTV) System Development & Demonstration | 05 | | | | 20,710 | | 20,710 | U |
| 175 | 0204202N | DDG-1000 | 05 | | | | 140,500 | | 140,500 | U |
| 176 | 0303267N | Auctioned Spectrum Relocation Fund*** | 05 | | | | | | | U |
| 177 | 0303367N | Spectrum Access Research and Development*** | 05 | | | | | | | U |
| 178 | 0303467N | SENSR Spectrum Pipeline SRF*** | 05 | | | | | | | U |
| 179 | 0304231N | Tactical Command System - MIP | 05 | | | | | | | U |
| 180 | 0304785N | Tactical Cryptologic Systems | 05 | | | | 28,311 | | 28,311 | U |
| 181 | 0305124N | Special Applications Program | 05 | | | | | | | U |
| 182 | 0306250M | Cyber Operations Technology Development | 05 | | | | 4,502 | | 4,502 | U |
| | | System Development & Demonstration | | | | | 6,367,502 | | 6,367,502 | |

***Funding in this Program Element was transferred during the year of execution from the Spectrum Relocation Fund (SRF) in support of the Advanced Wireless Services 3 (AWS-3) auction and is associated with the reallocation or sharing of the 1755-1780 MHz and 1695-1710 MHz bands. The SRF is administered by the Office of Management and Budget (OMB), which approves SRF transfers to federal agencies on an annual basis in consultation with the National Telecommunications and Information Administration (NTIA).

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Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2019 Base | FY 2019 OCO | FY 2019 Total | Sec |
|---|---|---|---|---|---|---|---|
| 167 | 0605327N | T-AO 205 Class | 05 | 1,298 | | 1,298 | U |
| 168 | 0605414N | Unmanned Carrier Aviation (UCA) | 05 | 718,942 | | 718,942 | U |
| 169 | 0605450M | Joint Air-to-Ground Missile (JAGM) | 05 | 6,759 | | 6,759 | U |
| 170 | 0605450N | Joint Air-to-Ground Missile (JAGM) | 05 | | | | U |
| 171 | 0605500N | Multi-mission Maritime Aircraft (MMA) | 05 | 37,296 | | 37,296 | U |
| 172 | 0605504N | Multi-Mission Maritime (MMA) Increment III | 05 | 160,389 | | 160,389 | U |
| 173 | 0605611M | Marine Corps Assault Vehicles System Development & Demonstration | 05 | 98,223 | | 98,223 | U |
| 174 | 0605813M | Joint Light Tactical Vehicle (JLTV) System Development & Demonstration | 05 | 2,260 | | 2,260 | U |
| 175 | 0204202N | DDG-1000 | 05 | 161,264 | | 161,264 | U |
| 176 | 0303267N | Auctioned Spectrum Relocation Fund*** | 05 | | | | U |
| 177 | 0303367N | Spectrum Access Research and Development*** | 05 | | | | U |
| 178 | 0303467N | SENSR Spectrum Pipeline SRF*** | 05 | | | | U |
| 179 | 0304231N | Tactical Command System - MIP | 05 | | | | U |
| 180 | 0304785N | Tactical Cryptologic Systems | 05 | 44,098 | | 44,098 | U |
| 181 | 0305124N | Special Applications Program | 05 | | | | U |
| 182 | 0306250M | Cyber Operations Technology Development | 05 | 6,808 | | 6,808 | U |
| | | System Development & Demonstration | | 6,042,480 | 1,100 | 6,043,580 | |

***Funding in this Program Element was transferred during the year of execution from the Spectrum Relocation Fund (SRF) in support of the Advanced Wireless Services 3 (AWS-3) auction and is associated with the reallocation or sharing of the 1755-1780 MHz and 1695-1710 MHz bands. The SRF is administered by the Office of Management and Budget (OMB), which approves SRF transfers to federal agencies on an annual basis in consultation with the National Telecommunications and Information Administration (NTIA).

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Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2017 (Base + OCO) | FY 2018 PB Request with CR Adj Base | FY 2018 Total PB Requests* with CR Adj Base | FY 2018 PB Request with CR Adj OCO | FY 2018 Total PB Requests+ with CR Adj OCO | Sec |
|---|---|---|---|---|---|---|---|---|---|
| 183 | 0604256N | Threat Simulator Development | 06 | 16,581 | 91,819 | 91,819 | | | U |
| 184 | 0604258N | Target Systems Development | 06 | 34,021 | 23,053 | 23,053 | | | U |
| 185 | 0604759N | Major T&E Investment | 06 | 51,375 | 52,634 | 52,634 | | | U |
| 186 | 0605126N | Joint Theater Air and Missile Defense Organization | 06 | 2,888 | 141 | 141 | | | U |
| 187 | 0605152N | Studies and Analysis Support - Navy | 06 | 3,861 | 3,917 | 3,917 | | | U |
| 188 | 0605154N | Center for Naval Analyses | 06 | 43,532 | 50,432 | 50,432 | | | U |
| 189 | 0605285N | Next Generation Fighter | 06 | 1,394 | | | | | U |
| 190 | 0605502N | Small Business Innovative Research | 06 | 370,665 | | | | | U |
| 191 | 0605804N | Technical Information Services | 06 | 1,494 | 782 | 782 | | | U |
| 192 | 0605853N | Management, Technical & International Support | 06 | 97,939 | 94,562 | 94,562 | | | U |
| 193 | 0605856N | Strategic Technical Support | 06 | 3,460 | 4,313 | 4,313 | | | U |
| 194 | 0605861N | RDT&E Science and Technology Management | 06 | 62,961 | 1,104 | 1,104 | | | U |
| 195 | 0605863N | RDT&E Ship and Aircraft Support | 06 | 105,693 | 105,666 | 105,666 | | | U |
| 196 | 0605864N | Test and Evaluation Support | 06 | 398,972 | 373,667 | 373,667 | | | U |
| 197 | 0605865N | Operational Test and Evaluation Capability | 06 | 17,984 | 20,298 | 20,298 | | | U |
| 198 | 0605866N | Navy Space and Electronic Warfare (SEW) Support | 06 | 9,658 | 17,341 | 17,341 | | | U |
| 199 | 0605867N | SEW Surveillance/Reconnaissance Support | 06 | 6,500 | | | | | U |

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(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2018 Emergency Requests** | FY 2018 Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req Emergency | FY 2018 Total PB Requests* with CR Adj Base + OCO + Emergency** | FY 2018 Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req with CR Adj Base + OCO + Emergency | Sec |
|---|---|---|---|---|---|---|---|---|---|---|
| 183 | 0604256N | Threat Simulator Development | 06 | | | | 91,819 | | 91,819 | U |
| 184 | 0604258N | Target Systems Development | 06 | | | | 23,053 | | 23,053 | U |
| 185 | 0604759N | Major T&E Investment | 06 | | | | 52,634 | | 52,634 | U |
| 186 | 0605126N | Joint Theater Air and Missile Defense Organization | 06 | | | | 141 | | 141 | U |
| 187 | 0605152N | Studies and Analysis Support - Navy | 06 | | | | 3,917 | | 3,917 | U |
| 188 | 0605154N | Center for Naval Analyses | 06 | | | | 50,432 | | 50,432 | U |
| 189 | 0605285N | Next Generation Fighter | 06 | | | | | | | U |
| 190 | 0605502N | Small Business Innovative Research | 06 | | | | | | | U |
| 191 | 0605804N | Technical Information Services | 06 | | | | 782 | | 782 | U |
| 192 | 0605853N | Management, Technical & International Support | 06 | | | | 94,562 | | 94,562 | U |
| 193 | 0605856N | Strategic Technical Support | 06 | | | | 4,313 | | 4,313 | U |
| 194 | 0605861N | RDT&E Science and Technology Management | 06 | | | | 1,104 | | 1,104 | U |
| 195 | 0605863N | RDT&E Ship and Aircraft Support | 06 | | | | 105,666 | | 105,666 | U |
| 196 | 0605864N | Test and Evaluation Support | 06 | | | | 373,667 | | 373,667 | U |
| 197 | 0605865N | Operational Test and Evaluation Capability | 06 | | | | 20,298 | | 20,298 | U |
| 198 | 0605866N | Navy Space and Electronic Warfare (SEW) Support | 06 | | | | 17,341 | | 17,341 | U |
| 199 | 0605867N | SEW Surveillance/Reconnaissance Support | 06 | | | | | | | U |

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Exhibit R-1 FY 2019 President's Budget
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(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2019 Base | FY 2019 OCO | FY 2019 Total | Sec |
|---|---|---|---|---|---|---|---|
| 183 | 0604256N | Threat Simulator Development | 06 | 94,576 | | 94,576 | U |
| 184 | 0604258N | Target Systems Development | 06 | 10,981 | | 10,981 | U |
| 185 | 0604759N | Major T&E Investment | 06 | 77,014 | | 77,014 | U |
| 186 | 0605126N | Joint Theater Air and Missile Defense Organization | 06 | 48 | | 48 | U |
| 187 | 0605152N | Studies and Analysis Support - Navy | 06 | 3,942 | | 3,942 | U |
| 188 | 0605154N | Center for Naval Analyses | 06 | 48,797 | | 48,797 | U |
| 189 | 0605285N | Next Generation Fighter | 06 | 5,000 | | 5,000 | U |
| 190 | 0605502N | Small Business Innovative Research | 06 | | | | U |
| 191 | 0605804N | Technical Information Services | 06 | 1,029 | | 1,029 | U |
| 192 | 0605853N | Management, Technical & International Support | 06 | 87,565 | | 87,565 | U |
| 193 | 0605856N | Strategic Technical Support | 06 | 4,231 | | 4,231 | U |
| 194 | 0605861N | RDT&E Science and Technology Management | 06 | 1,072 | | 1,072 | U |
| 195 | 0605863N | RDT&E Ship and Aircraft Support | 06 | 97,471 | | 97,471 | U |
| 196 | 0605864N | Test and Evaluation Support | 06 | 373,834 | | 373,834 | U |
| 197 | 0605865N | Operational Test and Evaluation Capability | 06 | 21,554 | | 21,554 | U |
| 198 | 0605866N | Navy Space and Electronic Warfare (SEW) Support | 06 | 16,227 | | 16,227 | U |
| 199 | 0605867N | SEW Surveillance/Reconnaissance Support | 06 | | | | U |

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Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2017 (Base + OCO) | FY 2018 PB Request with CR Adj Base | FY 2018 Total PB Requests* with CR Adj Base | FY 2018 PB Request with CR Adj OCO | FY 2018 Total PB Requests+ with CR Adj OCO | Sec |
|---|---|---|---|---|---|---|---|---|---|
| 200 | 0605873M | Marine Corps Program Wide Support | 06 | 19,142 | 21,751 | 21,751 | | | U |
| 201 | 0605898N | Management HQ - R&D | 06 | 16,188 | 44,279 | 44,279 | | | U |
| 202 | 0606355N | Warfare Innovation Management | 06 | 14,846 | 28,841 | 28,841 | | | U |
| 203 | 0606942M | Assessments and Evaluations Cyber Vulnerabilities | 06 | | | | | | U |
| 204 | 0606942N | Assessments and Evaluations Cyber Vulnerabilities | 06 | | | | | | U |
| 205 | 0305327N | Insider Threat | 06 | | | | | | U |
| 206 | 0902498N | Management Headquarters (Departmental Support Activities) | 06 | | 1,749 | 1,749 | | | U |
| 207 | 0909999N | Financing for Cancelled Account Adjustments | 06 | 136 | | | | | U |
| 208 | 1206867N | SEW Surveillance/Reconnaissance Support | 06 | | 9,408 | 9,408 | | | U |
| | | Management Support | | 1,279,290 | 945,757 | 945,757 | | | |
| 210 | 0604227N | HARPOON Modifications | 07 | | | | | | U |
| 211 | 0604840M | F-35 C2D2 | 07 | | | | | | U |
| 212 | 0604840N | F-35 C2D2 | 07 | | | | | | U |
| 213 | 0607658N | Cooperative Engagement Capability (CEC) | 07 | 75,099 | 92,571 | 92,571 | | | U |
| 214 | 0607700N | Deployable Joint Command and Control | 07 | 2,935 | 3,137 | 3,137 | | | U |
| 215 | 0101221N | Strategic Sub & Weapons System Support | 07 | 130,364 | 135,219 | 135,219 | | | U |

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Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2018 Emergency Requests** | FY 2018 Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req Emergency | FY 2018 Total PB Requests* with CR Adj Base + OCO + Emergency** | FY 2018 Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req with CR Adj Base + OCO + Emergency | Sec |
|---|---|---|---|---|---|---|---|---|---|---|
| 200 | 0605873M | Marine Corps Program Wide Support | 06 | | | | 21,751 | | 21,751 | U |
| 201 | 0605898N | Management HQ - R&D | 06 | | | | 44,279 | | 44,279 | U |
| 202 | 0606355N | Warfare Innovation Management | 06 | | | | 28,841 | | 28,841 | U |
| 203 | 0606942M | Assessments and Evaluations Cyber Vulnerabilities | 06 | | | | | | | U |
| 204 | 0606942N | Assessments and Evaluations Cyber Vulnerabilities | 06 | | | | | | | U |
| 205 | 0305327N | Insider Threat | 06 | | | | | | | U |
| 206 | 0902498N | Management Headquarters (Departmental Support Activities) | 06 | | | | 1,749 | | 1,749 | U |
| 207 | 0909999N | Financing for Cancelled Account Adjustments | 06 | | | | | | | U |
| 208 | 1206867N | SEW Surveillance/Reconnaissance Support | 06 | | | | 9,408 | | 9,408 | U |
| | | Management Support | | | | | 945,757 | | 945,757 | |
| 210 | 0604227N | HARPOON Modifications | 07 | | | | | | | U |
| 211 | 0604840M | F-35 C2D2 | 07 | | | | | | | U |
| 212 | 0604840N | F-35 C2D2 | 07 | | | | | | | U |
| 213 | 0607658N | Cooperative Engagement Capability (CEC) | 07 | | | | 92,571 | | 92,571 | U |
| 214 | 0607700N | Deployable Joint Command and Control | 07 | | | | 3,137 | | 3,137 | U |
| 215 | 0101221N | Strategic Sub & Weapons System Support | 07 | | | | 135,219 | | 135,219 | U |

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(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2019 Base | FY 2019 OCO | FY 2019 Total | Sec |
|---|---|---|---|---|---|---|---|
| 200 | 0605873M | Marine Corps Program Wide Support | 06 | 24,303 | | 24,303 | U |
| 201 | 0605898N | Management HQ - R&D | 06 | 43,262 | | 43,262 | U |
| 202 | 0606355N | Warfare Innovation Management | 06 | 41,918 | | 41,918 | U |
| 203 | 0606942M | Assessments and Evaluations Cyber Vulnerabilities | 06 | 7,000 | | 7,000 | U |
| 204 | 0606942N | Assessments and Evaluations Cyber Vulnerabilities | 06 | 48,800 | | 48,800 | U |
| 205 | 0305327N | Insider Threat | 06 | 1,682 | | 1,682 | U |
| 206 | 0902498N | Management Headquarters (Departmental Support Activities) | 06 | 1,579 | | 1,579 | U |
| 207 | 0909999N | Financing for Cancelled Account Adjustments | 06 | | | | U |
| 208 | 1206867N | SEW Surveillance/Reconnaissance Support | 06 | 8,684 | | 8,684 | U |
| | | Management Support | | 1,020,569 | | 1,020,569 | |
| 210 | 0604227N | HARPOON Modifications | 07 | 5,426 | | 5,426 | U |
| 211 | 0604840M | F-35 C2D2 | 07 | 259,122 | | 259,122 | U |
| 212 | 0604840N | F-35 C2D2 | 07 | 252,360 | | 252,360 | U |
| 213 | 0607658N | Cooperative Engagement Capability (CEC) | 07 | 130,515 | | 130,515 | U |
| 214 | 0607700N | Deployable Joint Command and Control | 07 | 3,127 | | 3,127 | U |
| 215 | 0101221N | Strategic Sub & Weapons System Support | 07 | 157,679 | | 157,679 | U |

Department of the Navy
FY 2019 President's Budget
Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2017 (Base + OCO) | FY 2018 PB Request with CR Adj Base | FY 2018 Total PB Requests* with CR Adj Base | FY 2018 PB Request with CR Adj OCO | FY 2018 Total PB Requests+ with CR Adj OCO | Sec |
|---|---|---|---|---|---|---|---|---|---|
| 216 | 0101224N | SSBN Security Technology Program | 07 | 32,910 | 36,242 | 36,242 | | | U |
| 217 | 0101226N | Submarine Acoustic Warfare Development | 07 | 7,300 | 12,053 | 12,053 | | | U |
| 218 | 0101402N | Navy Strategic Communications | 07 | 16,753 | 18,221 | 18,221 | | | U |
| 219 | 0204136N | F/A-18 Squadrons | 07 | 169,473 | 224,470 | 224,470 | | | U |
| 220 | 0204163N | Fleet Telecommunications (Tactical) | 07 | 38,949 | 33,525 | 33,525 | | | U |
| 221 | 0204228N | Surface Support | 07 | 20,595 | 24,829 | 24,829 | | | U |
| 222 | 0204229N | Tomahawk and Tomahawk Mission Planning Center (TMPC) | 07 | 49,149 | 133,617 | 133,617 | | | U |
| 223 | 0204311N | Integrated Surveillance System | 07 | 57,043 | 38,972 | 38,972 | 11,600 | 11,600 | U |
| 224 | 0204313N | Ship-Towed Array Surveillance Systems | 07 | | | | | | U |
| 225 | 0204413N | Amphibious Tactical Support Units (Displacement Craft) | 07 | 11,143 | 3,940 | 3,940 | | | U |
| 226 | 0204460M | Ground/Air Task Oriented Radar (G/ATOR) | 07 | 78,860 | 54,645 | 54,645 | | | U |
| 227 | 0204571N | Consolidated Training Systems Development | 07 | 44,435 | 66,518 | 66,518 | | | U |
| 228 | 0204574N | Cryptologic Direct Support | 07 | 1,122 | 1,155 | 1,155 | 1,200 | 1,200 | U |
| 229 | 0204575N | Electronic Warfare (EW) Readiness Support | 07 | 79,410 | 51,040 | 51,040 | | | U |
| 230 | 0205601N | HARM Improvement | 07 | 32,889 | 87,989 | 87,989 | | | U |
| 231 | 0205604N | Tactical Data Links | 07 | 121,396 | 89,852 | 89,852 | | | U |

Department of the Navy
FY 2019 President's Budget
Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2018 Emergency Requests** | FY 2018 Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req Emergency | FY 2018 Total PB Requests* with CR Adj Base + OCO + Emergency** | FY 2018 Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req with CR Adj Base + OCO + Emergency | Sec |
|---|---|---|---|---|---|---|---|---|---|---|
| 216 | 0101224N | SSBN Security Technology Program | 07 | | | | 36,242 | | 36,242 | U |
| 217 | 0101226N | Submarine Acoustic Warfare Development | 07 | | | | 12,053 | | 12,053 | U |
| 218 | 0101402N | Navy Strategic Communications | 07 | | | | 18,221 | | 18,221 | U |
| 219 | 0204136N | F/A-18 Squadrons | 07 | | | | 224,470 | | 224,470 | U |
| 220 | 0204163N | Fleet Telecommunications (Tactical) | 07 | | | | 33,525 | | 33,525 | U |
| 221 | 0204228N | Surface Support | 07 | | | | 24,829 | | 24,829 | U |
| 222 | 0204229N | Tomahawk and Tomahawk Mission Planning Center (TMPC) | 07 | | | | 133,617 | | 133,617 | U |
| 223 | 0204311N | Integrated Surveillance System | 07 | | | | 50,572 | | 50,572 | U |
| 224 | 0204313N | Ship-Towed Array Surveillance Systems | 07 | | | | | | | U |
| 225 | 0204413N | Amphibious Tactical Support Units (Displacement Craft) | 07 | | | | 3,940 | | 3,940 | U |
| 226 | 0204460M | Ground/Air Task Oriented Radar (G/ATOR) | 07 | | | | 54,645 | | 54,645 | U |
| 227 | 0204571N | Consolidated Training Systems Development | 07 | | | | 66,518 | | 66,518 | U |
| 228 | 0204574N | Cryptologic Direct Support | 07 | | | | 2,355 | | 2,355 | U |
| 229 | 0204575N | Electronic Warfare (EW) Readiness Support | 07 | | | | 51,040 | | 51,040 | U |
| 230 | 0205601N | HARM Improvement | 07 | | | | 87,989 | | 87,989 | U |
| 231 | 0205604N | Tactical Data Links | 07 | | | | 89,852 | | 89,852 | U |

Department of the Navy
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Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2019 Base | FY 2019 OCO | FY 2019 Total | Sec |
|---|---|---|---|---|---|---|---|
| 216 | 0101224N | SSBN Security Technology Program | 07 | 43,198 | | 43,198 | U |
| 217 | 0101226N | Submarine Acoustic Warfare Development | 07 | 11,311 | | 11,311 | U |
| 218 | 0101402N | Navy Strategic Communications | 07 | 39,313 | | 39,313 | U |
| 219 | 0204136N | F/A-18 Squadrons | 07 | 193,086 | | 193,086 | U |
| 220 | 0204163N | Fleet Telecommunications (Tactical) | 07 | 25,014 | | 25,014 | U |
| 221 | 0204228N | Surface Support | 07 | 11,661 | | 11,661 | U |
| 222 | 0204229N | Tomahawk and Tomahawk Mission Planning Center (TMPC) | 07 | 282,395 | | 282,395 | U |
| 223 | 0204311N | Integrated Surveillance System | 07 | 36,959 | | 36,959 | U |
| 224 | 0204313N | Ship-Towed Array Surveillance Systems | 07 | 15,454 | | 15,454 | U |
| 225 | 0204413N | Amphibious Tactical Support Units (Displacement Craft) | 07 | 6,073 | | 6,073 | U |
| 226 | 0204460M | Ground/Air Task Oriented Radar (G/ATOR) | 07 | 45,029 | | 45,029 | U |
| 227 | 0204571N | Consolidated Training Systems Development | 07 | 104,903 | | 104,903 | U |
| 228 | 0204574N | Cryptologic Direct Support | 07 | 4,544 | | 4,544 | U |
| 229 | 0204575N | Electronic Warfare (EW) Readiness Support | 07 | 66,889 | | 66,889 | U |
| 230 | 0205601N | HARM Improvement | 07 | 120,762 | | 120,762 | U |
| 231 | 0205604N | Tactical Data Links | 07 | 104,696 | | 104,696 | U |

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Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2017 (Base + OCO) | FY 2018 PB Request with CR Adj Base | FY 2018 Total PB Requests* with CR Adj Base | FY 2018 PB Request with CR Adj OCO | FY 2018 Total PB Requests+ with CR Adj OCO | Sec |
|---|---|---|---|---|---|---|---|---|---|
| 232 | 0205620N | Surface ASW Combat System Integration | 07 | 23,779 | 29,351 | 29,351 | | | U |
| 233 | 0205632N | MK-48 ADCAP | 07 | 48,507 | 68,553 | 68,553 | | | U |
| 234 | 0205633N | Aviation Improvements | 07 | 121,138 | 119,099 | 119,099 | | | U |
| 235 | 0205675N | Operational Nuclear Power Systems | 07 | 101,786 | 127,445 | 127,445 | | | U |
| 236 | 0206313M | Marine Corps Communications Systems | 07 | 141,171 | 123,825 | 123,825 | | | U |
| 237 | 0206335M | Common Aviation Command and Control System (CAC2S) | 07 | 6,934 | 7,343 | 7,343 | | | U |
| 238 | 0206623M | Marine Corps Ground Combat/ Supporting Arms Systems | 07 | 45,877 | 66,009 | 66,009 | | | U |
| 239 | 0206624M | Marine Corps Combat Services Support | 07 | 11,639 | 25,258 | 25,258 | | | U |
| 240 | 0206625M | USMC Intelligence/Electronic Warfare Systems (MIP) | 07 | 22,978 | 30,886 | 30,886 | | | U |
| 241 | 0206629M | Amphibious Assault Vehicle | 07 | 36,571 | 58,728 | 58,728 | | | U |
| 242 | 0207161N | Tactical AIM Missiles | 07 | 54,678 | 42,884 | 42,884 | | | U |
| 243 | 0207163N | Advanced Medium Range Air-to-Air Missile (AMRAAM) | 07 | 34,010 | 25,364 | 25,364 | | | U |
| 244 | 0219902M | Global Combat Support System - Marine Corps (GCSS-MC) | 07 | 9,128 | | | | | U |
| 248 | 0303109N | Satellite Communications (SPACE) | 07 | 30,826 | | | | | U |
| 249 | 0303138N | Consolidated Afloat Network Enterprise Services (CANES) | 07 | 23,224 | 24,271 | 24,271 | | | U |
| 250 | 0303140N | Information Systems Security Program | 07 | 32,708 | 50,269 | 50,269 | | | U |

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Total Obligational Authority
(Dollars in Thousands)

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Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2018 Emergency Requests** | FY 2018 Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req Emergency | FY 2018 Total PB Requests* with CR Adj Base + OCO + Emergency** | FY 2018 Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req with CR Adj Base + OCO + Emergency | Sec |
|---|---|---|---|---|---|---|---|---|---|---|
| 232 | 0205620N | Surface ASW Combat System Integration | 07 | | | | 29,351 | | 29,351 | U |
| 233 | 0205632N | MK-48 ADCAP | 07 | | | | 68,553 | | 68,553 | U |
| 234 | 0205633N | Aviation Improvements | 07 | | | | 119,099 | | 119,099 | U |
| 235 | 0205675N | Operational Nuclear Power Systems | 07 | | | | 127,445 | | 127,445 | U |
| 236 | 0206313M | Marine Corps Communications Systems | 07 | | | | 123,825 | | 123,825 | U |
| 237 | 0206335M | Common Aviation Command and Control System (CAC2S) | 07 | | | | 7,343 | | 7,343 | U |
| 238 | 0206623M | Marine Corps Ground Combat/ Supporting Arms Systems | 07 | | | | 66,009 | | 66,009 | U |
| 239 | 0206624M | Marine Corps Combat Services Support | 07 | | | | 25,258 | | 25,258 | U |
| 240 | 0206625M | USMC Intelligence/Electronic Warfare Systems (MIP) | 07 | | | | 30,886 | | 30,886 | U |
| 241 | 0206629M | Amphibious Assault Vehicle | 07 | | | | 58,728 | | 58,728 | U |
| 242 | 0207161N | Tactical AIM Missiles | 07 | | | | 42,884 | | 42,884 | U |
| 243 | 0207163N | Advanced Medium Range Air-to-Air Missile (AMRAAM) | 07 | | | | 25,364 | | 25,364 | U |
| 244 | 0219902M | Global Combat Support System - Marine Corps (GCSS-MC) | 07 | | | | | | | U |
| 248 | 0303109N | Satellite Communications (SPACE) | 07 | | | | | | | U |
| 249 | 0303138N | Consolidated Afloat Network Enterprise Services (CANES) | 07 | | | | 24,271 | | 24,271 | U |
| 250 | 0303140N | Information Systems Security Program | 07 | | | | 50,269 | | 50,269 | U |

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Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2019 Base | FY 2019 OCO | FY 2019 Total | Sec |
|---|---|---|---|---|---|---|---|
| 232 | 0205620N | Surface ASW Combat System Integration | 07 | 28,421 | | 28,421 | U |
| 233 | 0205632N | MK-48 ADCAP | 07 | 94,155 | | 94,155 | U |
| 234 | 0205633N | Aviation Improvements | 07 | 121,805 | | 121,805 | U |
| 235 | 0205675N | Operational Nuclear Power Systems | 07 | 117,028 | | 117,028 | U |
| 236 | 0206313M | Marine Corps Communications Systems | 07 | 174,779 | 16,130 | 190,909 | U |
| 237 | 0206335M | Common Aviation Command and Control System (CAC2S) | 07 | 4,826 | | 4,826 | U |
| 238 | 0206623M | Marine Corps Ground Combat/ Supporting Arms Systems | 07 | 97,152 | | 97,152 | U |
| 239 | 0206624M | Marine Corps Combat Services Support | 07 | 30,156 | | 30,156 | U |
| 240 | 0206625M | USMC Intelligence/Electronic Warfare Systems (MIP) | 07 | 39,976 | | 39,976 | U |
| 241 | 0206629M | Amphibious Assault Vehicle | 07 | 22,637 | | 22,637 | U |
| 242 | 0207161N | Tactical AIM Missiles | 07 | 40,121 | | 40,121 | U |
| 243 | 0207163N | Advanced Medium Range Air-to-Air Missile (AMRAAM) | 07 | 32,473 | | 32,473 | U |
| 244 | 0219902M | Global Combat Support System - Marine Corps (GCSS-MC) | 07 | | | | U |
| 248 | 0303109N | Satellite Communications (SPACE) | 07 | | | | U |
| 249 | 0303138N | Consolidated Afloat Network Enterprise Services (CANES) | 07 | 23,697 | | 23,697 | U |
| 250 | 0303140N | Information Systems Security Program | 07 | 44,228 | | 44,228 | U |

Department of the Navy
FY 2019 President's Budget
Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2017 (Base + OCO) | FY 2018 PB Request with CR Adj Base | FY 2018 Total PB Requests* with CR Adj Base | FY 2018 PB Request with CR Adj OCO | FY 2018 Total PB Requests+ with CR Adj OCO | Sec |
|---|---|---|---|---|---|---|---|---|---|
| 252 | 0305192N | Military Intelligence Program (MIP) Activities | 07 | 6,019 | 6,352 | 6,352 | | | U |
| 253 | 0305204N | Tactical Unmanned Aerial Vehicles | 07 | 8,436 | 7,770 | 7,770 | | | U |
| 254 | 0305205N | UAS Integration and Interoperability | 07 | 21,543 | 39,736 | 39,736 | | | U |
| 255 | 0305208M | Distributed Common Ground/Surface Systems | 07 | 2,079 | 12,867 | 12,867 | | | U |
| 256 | 0305208N | Distributed Common Ground/Surface Systems | 07 | 44,564 | 46,150 | 46,150 | | | U |
| 257 | 0305220N | MQ-4C Triton | 07 | 113,606 | 84,115 | 84,115 | | | U |
| 258 | 0305231N | MQ-8 UAV | 07 | 26,518 | 62,656 | 62,656 | | | U |
| 259 | 0305232M | RQ-11 UAV | 07 | | 2,022 | 2,022 | | | U |
| 260 | 0305234N | Small (Level 0) Tactical UAS (STUASL0) | 07 | 5,071 | 4,835 | 4,835 | | | U |
| 261 | 0305239M | RQ-21A | 07 | 8,379 | 8,899 | 8,899 | | | U |
| 262 | 0305241N | Multi-Intelligence Sensor Development | 07 | 64,765 | 99,020 | 99,020 | | | U |
| 263 | 0305242M | Unmanned Aerial Systems (UAS) Payloads (MIP) | 07 | 11,181 | 18,578 | 18,578 | | | U |
| 264 | 0305421N | RQ-4 Modernization | 07 | 144,477 | 229,404 | 229,404 | | | U |
| 265 | 0308601N | Modeling and Simulation Support | 07 | 4,529 | 5,238 | 5,238 | | | U |
| 266 | 0702207N | Depot Maintenance (Non-IF) | 07 | 37,089 | 38,227 | 38,227 | | | U |
| 267 | 0708730N | Maritime Technology (MARITECH) | 07 | 3,080 | 4,808 | 4,808 | | | U |

Department of the Navy
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Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2018 Emergency Requests** | FY 2018 Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req Emergency | FY 2018 Total PB Requests* with CR Adj Base + OCO + Emergency** | FY 2018 Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req with CR Adj Base + OCO + Emergency | Sec |
|---|---|---|---|---|---|---|---|---|---|---|
| 252 | 0305192N | Military Intelligence Program (MIP) Activities | 07 | | | | 6,352 | | 6,352 | U |
| 253 | 0305204N | Tactical Unmanned Aerial Vehicles | 07 | | | | 7,770 | | 7,770 | U |
| 254 | 0305205N | UAS Integration and Interoperability | 07 | | | | 39,736 | | 39,736 | U |
| 255 | 0305208M | Distributed Common Ground/Surface Systems | 07 | | | | 12,867 | | 12,867 | U |
| 256 | 0305208N | Distributed Common Ground/Surface Systems | 07 | | | | 46,150 | | 46,150 | U |
| 257 | 0305220N | MQ-4C Triton | 07 | | | | 84,115 | | 84,115 | U |
| 258 | 0305231N | MQ-8 UAV | 07 | | | | 62,656 | | 62,656 | U |
| 259 | 0305232M | RQ-11 UAV | 07 | | | | 2,022 | | 2,022 | U |
| 260 | 0305234N | Small (Level 0) Tactical UAS (STUASL0) | 07 | | | | 4,835 | | 4,835 | U |
| 261 | 0305239M | RQ-21A | 07 | | | | 8,899 | | 8,899 | U |
| 262 | 0305241N | Multi-Intelligence Sensor Development | 07 | | | | 99,020 | | 99,020 | U |
| 263 | 0305242M | Unmanned Aerial Systems (UAS) Payloads (MIP) | 07 | | | | 18,578 | | 18,578 | U |
| 264 | 0305421N | RQ-4 Modernization | 07 | | | | 229,404 | | 229,404 | U |
| 265 | 0308601N | Modeling and Simulation Support | 07 | | | | 5,238 | | 5,238 | U |
| 266 | 0702207N | Depot Maintenance (Non-IF) | 07 | | | | 38,227 | | 38,227 | U |
| 267 | 0708730N | Maritime Technology (MARITECH) | 07 | | | | 4,808 | | 4,808 | U |

Department of the Navy
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Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2019 Base | FY 2019 OCO | FY 2019 Total | Sec |
|---|---|---|---|---|---|---|---|
| 252 | 0305192N | Military Intelligence Program (MIP) Activities | 07 | 6,081 | | 6,081 | U |
| 253 | 0305204N | Tactical Unmanned Aerial Vehicles | 07 | 8,529 | | 8,529 | U |
| 254 | 0305205N | UAS Integration and Interoperability | 07 | 41,212 | | 41,212 | U |
| 255 | 0305208M | Distributed Common Ground/Surface Systems | 07 | 7,687 | | 7,687 | U |
| 256 | 0305208N | Distributed Common Ground/Surface Systems | 07 | 42,846 | | 42,846 | U |
| 257 | 0305220N | MQ-4C Triton | 07 | 14,395 | | 14,395 | U |
| 258 | 0305231N | MQ-8 UAV | 07 | 9,843 | | 9,843 | U |
| 259 | 0305232M | RQ-11 UAV | 07 | 524 | | 524 | U |
| 260 | 0305234N | Small (Level 0) Tactical UAS (STUASL0) | 07 | 5,360 | | 5,360 | U |
| 261 | 0305239M | RQ-21A | 07 | 10,914 | | 10,914 | U |
| 262 | 0305241N | Multi-Intelligence Sensor Development | 07 | 81,231 | | 81,231 | U |
| 263 | 0305242M | Unmanned Aerial Systems (UAS) Payloads (MIP) | 07 | 5,956 | | 5,956 | U |
| 264 | 0305421N | RQ-4 Modernization | 07 | 219,894 | | 219,894 | U |
| 265 | 0308601N | Modeling and Simulation Support | 07 | 7,097 | | 7,097 | U |
| 266 | 0702207N | Depot Maintenance (Non-IF) | 07 | 36,560 | | 36,560 | U |
| 267 | 0708730N | Maritime Technology (MARITECH) | 07 | 7,284 | | 7,284 | U |

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Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2017 (Base + OCO) | FY 2018 PB Request with CR Adj Base | FY 2018 Total PB Requests* with CR Adj Base | FY 2018 PB Request with CR Adj OCO | FY 2018 Total PB Requests+ with CR Adj OCO | Sec |
|---|---|---|---|---|---|---|---|---|---|
| 268 | 1203109N | Satellite Communications (SPACE) | 07 | | 37,836 | 37,836 | | | U |
| 9999 | 9999999999 | Classified Programs | | 1,602,086 | 1,364,347 | 1,364,347 | 89,855 | 89,855 | U |
| | | Operational Systems Development | | 3,818,201 | 3,980,140 | 3,980,140 | 102,655 | 102,655 | |
| 269 | 0901560N | Continuing Resolution Programs | 20 | | -558,059 | -558,059 | 196,172 | 158,972 | U |
| | | Undistributed | | | -558,059 | -558,059 | 196,172 | 158,972 | |
| Total Research, Development, Test & Eval, Navy | | | | 17,851,955 | 17,116,976 | 17,091,976 | 326,537 | 326,537 | |

Department of the Navy
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Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2018 Emergency Requests** | FY 2018 Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req Emergency | FY 2018 Total PB Requests* with CR Adj Base + OCO + Emergency** | FY 2018 Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req with CR Adj Base + OCO + Emergency | Sec |
|---|---|---|---|---|---|---|---|---|---|---|
| 268 | 1203109N | Satellite Communications (SPACE) | 07 | | | | 37,836 | | 37,836 | U |
| 9999 | 9999999999 | Classified Programs | | 60,000 | -60,000 | | 1,514,202 | -60,000 | 1,454,202 | U |
| | | Operational Systems Development | | | | | 4,142,795 | | 4,082,795 | |
| 269 | 0901560N | Continuing Resolution Programs | 20 | | | | -399,087 | | -399,087 | U |
| | | Undistributed | | | | | -399,087 | | -399,087 | |
| Total Research, Development, Test & Eval, Navy | | | | | | | 17,478,513 | | 17,418,513 | |

Department of the Navy
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Exhibit R-1 FY 2019 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

| Line No | Program Element Number | Item | Act | FY 2019 Base | FY 2019 OCO | FY 2019 Total | Sec |
|---|---|---|---|---|---|---|---|
| 268 | 1203109N | Satellite Communications (SPACE) | 07 | 39,174 | | 39,174 | U |
| 9999 | 9999999999 | Classified Programs | | 1,518,903 | 147,882 | 1,666,785 | U |
| | | Operational Systems Development | | 4,854,460 | 164,012 | 5,018,472 | |
| 269 | 0901560N | Continuing Resolution Programs | 20 | | | | U |
| | | Undistributed | | | | | |
| Total Research, Development, Test & Eval, Navy | | | | 18,451,066 | 198,412 | 18,649,478 | |

Department of the Navy
FY 2019 President's Budget
Exhibit R-1 FY 2019 President's Budget
Non RDT&E Title
(Dollars in Thousands)

| Summary Recap of Budget Activities | FY 2017 (Base + OCO) | FY 2018 PB Request with CR Adj Base | FY 2018 Total PB Requests* with CR Adj Base | FY 2018 PB Request with CR Adj OCO | FY 2018 Total PB Requests+ with CR Adj OCO |
|---|---|---|---|---|---|
| Research and Development | 7,237 | 18,622 | 18,622 | | |
| Total Research, Development, Test & Evaluation | 7,237 | 18,622 | 18,622 | | |

Summary Recap of Non-RDT&E Title FYDP Programs

| | | | | | |
|---|---|---|---|---|---|
| Mobility Forces | 7,237 | 18,622 | 18,622 | | |
| Total Research, Development, Test & Evaluation | 7,237 | 18,622 | 18,622 | | |

Department of the Navy
FY 2019 President's Budget
Exhibit R-1 FY 2019 President's Budget
Non RDT&E Title
(Dollars in Thousands)

| Summary Recap of Budget Activities | FY 2018 Emergency Requests** Emergency | FY 2018 Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req Emergency | FY 2018 Total PB Requests* with CR Adj Base + OCO + Emergency** | FY 2018 Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req with CR Adj Base + OCO + Emergency |
|---|---|---|---|---|---|---|
| Research and Development | | | | 18,622 | | 18,622 |
| Total Research, Development, Test & Evaluation | | | | 18,622 | | 18,622 |

Summary Recap of Non-RDT&E Title FYDP Programs

| | | | | | | |
|---|---|---|---|---|---|---|
| Mobility Forces | | | | 18,622 | | 18,622 |
| Total Research, Development, Test & Evaluation | | | | 18,622 | | 18,622 |

Department of the Navy
FY 2019 President's Budget
Exhibit R-1 FY 2019 President's Budget
Non RDT&E Title
(Dollars in Thousands)

| Summary Recap of Budget Activities | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|
| Research and Development | | | |
| Total Research, Development, Test & Evaluation | | | |
| **Summary Recap of Non-RDT&E Title FYDP Programs** | | | |
| Mobility Forces | | | |
| Total Research, Development, Test & Evaluation | | | |

Department of the Navy
FY 2019 President's Budget
Exhibit R-1 FY 2019 President's Budget
Non RDT&E Title
(Dollars in Thousands)

Appropriation: 4557N National Defense Sealift Fund

| Line No | Program Element Number | Item | Act | FY 2017 (Base + OCO) | FY 2018 PB Request with CR Adj Base | FY 2018 Total PB Requests* with CR Adj Base | FY 2018 PB Request with CR Adj OCO | FY 2018 Total PB Requests+ with CR Adj OCO | Sec |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0408042N | National Defense Sealift Fund | 04 | 7,237 | 18,622 | 18,622 | | | U |
| | | Research and Development | | 7,237 | 18,622 | 18,622 | | | |
| Total National Defense Sealift Fund | | | | 7,237 | 18,622 | 18,622 | | | |

Department of the Navy
FY 2019 President's Budget
Exhibit R-1 FY 2019 President's Budget
Non RDT&E Title
(Dollars in Thousands)

Appropriation: 4557N National Defense Sealift Fund

| Line No | Program Element Number | Item | Act | FY 2018 Emergency Requests** Emergency | FY 2018 Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req Emergency | FY 2018 Total PB Requests* with CR Adj Base + OCO + Emergency** | FY 2018 Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs | FY 2018 Remaining Req with CR Adj Base + OCO + Emergency | Sec |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0408042N | National Defense Sealift Fund | 04 | | | | 18,622 | | 18,622 | U |
| | | Research and Development | | | | | 18,622 | | 18,622 | |
| Total National Defense Sealift Fund | | | | | | | 18,622 | | 18,622 | |

Department of the Navy
FY 2019 President's Budget
Exhibit R-1 FY 2019 President's Budget
Non RDT&E Title
(Dollars in Thousands)

Appropriation: 4557N National Defense Sealift Fund

| Line No | Program Element Number | Item | Act | FY 2019 Base | FY 2019 OCO | FY 2019 Total | Sec |
|---|---|---|---|---|---|---|---|
| 1 | 0408042N | National Defense Sealift Fund | 04 | | | | U |
| | | | | ---------- | ---------- | ---------- | |
| | | Research and Development | | | | | |
| | | | | ---------- | ---------- | ---------- | |
| Total National Defense Sealift Fund | | | | | | | |

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| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603207N *I Air/Ocean Tactical Applications* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 571.862 | 44.175 | 48.365 | 29.747 | - | 29.747 | 33.642 | 34.763 | 34.956 | 37.582 | Continuing | Continuing |
| 2341: *METOC Data Acquisition* | 167.779 | 4.268 | 5.483 | 3.471 | - | 3.471 | 5.238 | 5.741 | 5.948 | 7.859 | Continuing | Continuing |
| 2342: *METOC Data Assimilation and Mod* | 231.124 | 20.082 | 21.111 | 17.441 | - | 17.441 | 21.117 | 21.596 | 21.495 | 22.441 | Continuing | Continuing |
| 2343: *Tactical METOC Applications* | 153.449 | 10.275 | 11.715 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 175.439 |
| 2344: *Precise Time and Astrometry* | 10.689 | 4.844 | 5.190 | 4.556 | - | 4.556 | 2.946 | 3.006 | 3.017 | 3.079 | Continuing | Continuing |
| 2363: *Remote Sensing Capability Development* | 7.355 | 3.773 | 3.959 | 0.324 | - | 0.324 | 0.327 | 0.328 | 0.328 | 0.000 | 0.000 | 16.394 |
| 3207: *Fleet Synthetic Training* | 1.466 | 0.933 | 0.253 | 0.266 | - | 0.266 | 0.283 | 0.305 | 0.326 | 0.332 | Continuing | Continuing |
| 3404: *Tactical Environmental Support* | 0.000 | 0.000 | 0.327 | 2.595 | - | 2.595 | 2.616 | 2.643 | 2.671 | 2.685 | Continuing | Continuing |
| 3405: *Decision Support Products & Dissemination* | 0.000 | 0.000 | 0.327 | 1.094 | - | 1.094 | 1.115 | 1.144 | 1.171 | 1.186 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

The Air Tactical Applications (AOTA) Program Element is aligned with the Navy's maritime strategy to enhance the future mission capabilities of the Navy-Marine Corps Meteorological and Oceanographic (METOC) Team supporting naval warfighters worldwide. New state-of-the art government and commercial technologies are identified, transitioned, demonstrated and then integrated into Combat Systems and programs of record to provide capabilities that provide real-time and near-real-time operational effects of the physical environment on the performance of combat forces and their new and emerging platforms, sensors, systems and munitions. The AOTA program element focuses on sensing and characterizing and predicting the littoral and deep-strike battlespace in the context of regional conflicts and crisis response scenarios. Projects in this program element transition state-of-the art sensing, assimilation, modeling and decision aid technologies from government and commercial sources. Unique project development efforts include atmospheric and oceanographic data assimilation techniques, forecast models, data base management systems and associated software for use in mainframe, desktop and laptop computers. Model data, products and services can be used by forward-deployed personnel or in a reach-back mode to optimize sensor placement and force allocation decisions. Global Geospatial Information and Services efforts within this program address the bathymetric needs of the Navy. Also developed are algorithms to process new satellite sensor data for integration into Navy and Marine Corps decision support systems and for display as part of the common operational and tactical pictures. In addition, the projects provide for demonstration and validation of specialized atmospheric and oceanographic instrumentation and measurement techniques, new sensors, communications and interfaces. Included are new capabilities to assess, predict and enhance the performance of current and emerging undersea warfare and mine warfare weapons systems. AOTA capabilities are designed to support the latest versions of the Global Command and Control System and specific unit-level combat systems. This program element develops technological upgrades for the U.S. Naval

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603207N *I Air/Ocean Tactical Applications* |

Observatory's Master Clock system to meet requirements of Department of Defense communications, cryptographic, intelligence, geolocation, and targeting systems; develops near-real-time earth orientation predictions; develops very precise determination of positions of both faint and bright stars; and supports satellite tracking and space debris studies.

Major emphasis areas include the Naval Integrated Tactical Environmental System Next Generation (NITES-Next) and the METOC Data Acquisition, the METOC Data Assimilation & Modeling, the Precise Timing and Astrometry, the Fleet Synthetic Training, the Tactical Environmental Support, Decision Support Products & Dissemination, the Earth System Prediction Capability projects, and the Remote Sensing Capability Development.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 48.536 | 48.365 | 49.741 | - | 49.741 |
| Current President's Budget | 44.175 | 48.365 | 29.747 | - | 29.747 |
| Total Adjustments | -4.361 | 0.000 | -19.994 | - | -19.994 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | -0.015 | 0.000 | | | |
| • SBIR/STTR Transfer | -0.746 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | -17.673 | 2.500 | -15.173 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -2.321 | -2.500 | -4.821 |
| • Congressional Directed Reductions Adjustments | -3.600 | - | - | - | - |

**Change Summary Explanation**

Schedule- 1) The schedule for PTA is updated to reflect the additional required research and upgrades.

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| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603207N / *Air/Ocean Tactical Applications* | Project (Number/Name)<br>2341 / *METOC Data Acquisition* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2341: *METOC Data Acquisition* | 167.779 | 4.268 | 5.483 | 3.471 | - | 3.471 | 5.238 | 5.741 | 5.948 | 7.859 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The major work of the Meteorology and Oceanography (METOC) Data Acquisition Project is to provide future mission capabilities to warfighters allowing them to detect and monitor the conditions of the physical environment throughout the entire battlespace. The most promising new sensor technologies (including unmanned vehicles, tactical sensor exploitation, in-situ sensors) are transitioned from the government's and commercial industry's technology base. These new sensor technologies are demonstrated, validated and integrated into operational programs for warfighters. These new sensor capabilities provide timely and accurate METOC data to operational and tactical commanders. METOC data requirements have evolved with emphasis on naval warfare shifting to littoral and deep strike battlespace. The need to accurately characterize dynamic conditions are crucial in planning and executing warfare operations and effectively allocating force weapon and sensor systems. Routinely available data sources, such as climatology, oceanographic and meteorological numerical models are necessary but not sufficient to support the littoral and deep strike regions. Operational sensors are deployed great distances from the target area of interest. The challenge is to collect and disseminate METOC data in variable and dynamic littoral environmental conditions or in denied, remote or inaccessible areas over extended periods of time.

This project: 1) provides the means to rapidly and automatically acquire a broad array of METOC data using off-board and on-board sensors; 2) provides an on-scene assessment capability for the tactical commander; 3) provides the tactical commander with real-time METOC data and products for operational use; 4) demonstrates and validates the use of tactical workstations and desktop computers for processing and display of METOC data and products; 5) demonstrates and validates techniques which employ data compression, connectivity and interface technologies to obtain, store, process, distribute and display these METOC data and products; 6) develops new charting and bathymetric survey techniques necessary to reduce the existing shortfall in coastal hydrographic survey requirements; 7) develops an expanded database for predictive METOC models in areas of interest; and 8) supports the development of radar weather using through-the-sensor techniques. Major emphasis area Tactical Oceanographic Capabilities project.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Meteorological and Oceanographic (METOC) Future Mission Capabilities (FMC) | 4.061 | 0.000 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Fleet Naval METOC has updated the definition and structure of the METOC program along the lines of operational mission needs. This update focuses on the operational characteristics of Tasking, Collection, Processing, Exploitation, and Dissemination (TCPED) of METOC data and information. Identified efforts supporting METOC are realigned to projects and activities that align to the TCPED updated program structure. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2341 / *METOC Data Acquisition* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| FY2018 funding realigned to sub project METOC Data Acquisition, project unit (PU) 3404 Tactical Environmental Support, and PU 3405 Decision Support Products & Dissemination.<br><br>***FY 2018 Plans:***<br>NA<br>***FY 2019 Base Plans:***<br>N/A<br>***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***Title:*** Tactical Oceanography Capabilities (TOC) / Undersea Warfare (USW)<br>***Articles:***<br><br>***Description:*** Fleet Naval METOC has updated the definition and structure of the METOC program along the lines of operational mission needs. This update focuses on the operational characteristics of Tasking, Collection, Processing, Exploitation, and Dissemination (TCPED) of METOC data and information. Identified efforts supporting METOC are realigned to projects and activities that align to the TCPED updated program structure.<br><br>FY2018 funding realigned to sub project METOC Data Acquisition, project unit (PU) 3404 Tactical Environmental Support, and PU 3405 Decision Support Products & Dissemination.<br><br>***FY 2018 Plans:***<br>NA<br>***FY 2019 Base Plans:***<br>NA<br>***FY 2019 OCO Plans:***<br>NA<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY2018 funding realigned to sub project METOC Data Acquisition, project unit (PU) 3404 Tactical Environmental Support, and PU 3405 Decision Support Products & Dissemination. | 0.207<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- |
| ***Title:*** Meteorological and Oceanographic (METOC) Data Acquisition<br>***Articles:*** | 0.000<br>- | 5.483<br>- | 3.471<br>- | 0.000<br>- | 3.471<br>- |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2341 / *METOC Data Acquisition* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Description:*** Efforts falling within the Meteorology and Oceanography (METOC) Collections Project provide future scientific and technological warfighting capabilities that detect and continuously monitor environmental (atmospheric, sea surface, oceanographic and seabed) conditions throughout the battlespace. The Navy's mission continues to require focus on blue-water operations, littoral and deep-strike (inland) battlespaces. Each of these operating areas (and the transitions between them) has its own dynamic and complex environmental characteristics and behaviors that require modifying METOC Collections and associated sensing strategies and methodologies. Without reliable characterization of ocean and atmosphere in these operating areas, the Navy risks ineffective allocation and employment of warfighters and weapon systems, and the sensors that fully enable them.<br><br>Fleet Naval METOC has updated the definition and structure of the METOC program along the lines of operational mission needs. This update focuses on the operational characteristics of Tasking, Collection, Processing, Exploitation, and Dissemination (TCPED) of METOC data and information. Identified efforts supporting METOC are realigned to projects and activities that align to the TCPED updated program structure.<br><br>FY2018 funding realigned to project unit (PU) 2341 METOC Data Acquisition from PU 2341 Meteorological and Oceanographic (METOC) Future Mission Capabilities (FMC) and Tactical Oceanography Capabilities (TOC)/ Undersea Warfare (USW) and PE 0604218N (Air/Ocean Equipment Engineering) PU 2345. This is not a new Start<br><br>FY2019 funding in this project is realigned to PU 3404 Tactical Environmental Support for follow-on efforts that will more fully transition tactical environmental technologies into Fleet operations, as well as address operational lessons learned from fielding of recently introduced technologies.<br><br>***FY 2018 Plans:***<br>- Continue: Test, validate, and transition new components for data assimilation capabilities for global and mesoscale atmospheric models that address multiple scales.<br>- Begin: Implement a "rapid innovation" weather-ocean capability that emphasizes observing systems.<br>- Continue: Supplement efforts in a FY17-19 Rapid Transition Project to solve the overall Forward ocean data assimilation problem and integrate results into Anti-submarine Warfare Tactical Decision Aids. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2341 / *METOC Data Acquisition* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Continue: Provide technical support to passive microwave and weather satellite follow-on remote sensing projects for all phases of pre- and post-launch sensor calibration, algorithm validation, data exploitation, dissemination and quality control of critical synoptic atmospheric and geophysical environmental data products.<br>- Continue: Develop and test a Navy Coupled Ocean Data Assimilation-based capability for forward platforms to assimilate collected oceanographic data into an oceanographic model field in an acoustically consistent way.<br>- Continue: Develop, validate and transition bias correction for extended-range forecasts in the global and regional coupled systems, using information from the satellite observations to measure the bias and guide the correction.<br>- Continue: Collect in-situ transmission loss from tactical platforms in support of a Low Frequency Bottom Loss database.<br>- Continue: Develop a methodology for creating a bottom backscattering database in Deep Water, i.e., water depths deeper than the continental rise, and apply the methodology to regions of operational interest to create a Prototype Deep Ocean Bottom Scattering database.<br>- Begin: Assimilate satellite optical data streams into the Coupled Ocean-Atmosphere Mesoscale Prediction System ocean model component.<br>- Continue: Characterize/assess biological scattering and attenuation at tactical frequencies, known to have a significant impact on mid-frequency active sonar systems.<br>- Complete: Deliver environmental data collected by the P-8 aircraft, to be incorporated into prediction tools. | | | | | |
| ***FY 2019 Base Plans:***<br>Continue all efforts of FY18 less those noted as completed. The effort also plans to focus on each category as described below:<br><br>- Continue: Implement a "rapid innovation" weather-ocean capability that emphasizes observing systems.<br>- Continue: Assimilate satellite optical data streams into the Coupled Ocean-Atmosphere Mesoscale Prediction System ocean model component.<br>- Complete: Test, validate, and transition new components for data assimilation capabilities for global and mesoscale atmospheric models that address multiple scales.<br>- Complete: Supplement efforts in a FY17-19 Rapid Transition Project to solve the overall Forward ocean data assimilation problem and integrate results into Anti-submarine Warfare Tactical Decision Aids.<br>- Complete: Provide technical support to passive microwave and weather satellite follow-on remote sensing projects for all phases of pre- and post-launch sensor calibration, algorithm validation, data exploitation, dissemination and quality control of critical synoptic atmospheric and geophysical environmental data products. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2341 / *METOC Data Acquisition* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Complete: Develop and test a Navy Coupled Ocean Data Assimilation-based capability for forward platforms to assimilate collected oceanographic data into an oceanographic model field in an acoustically consistent way.<br>- Complete: Develop, validate and transition bias correction for extended-range forecasts in the global and regional coupled systems, using information from the satellite observations to measure the bias and guide the correction.<br>- Complete: Collect in-situ transmission loss from tactical platforms in support of a Low Frequency Bottom Loss database.<br>- Complete: Develop a methodology for creating a bottom backscattering database in Deep Water, i.e., water depths deeper than the continental rise, and apply the methodology to regions of operational interest to create a Prototype Deep Ocean Bottom Scattering database.<br>- Complete: Characterize/assess biological scattering and attenuation at tactical frequencies, known to have a significant impact on mid-frequency active sonar systems.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Funding Decreases from FY18 to FY19 in this project are realigned to PROJ 3404 for follow-on efforts that will more fully transition tactical environmental technologies into Fleet operations, as well as address operational lessons learned from fielding of recently introduced technologies. This feedback mechanism enables agility, thus accelerating the improvement of capabilities that provide a distinct tactical advantage to the Fleet and Marine Corps. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 4.268 | 5.483 | 3.471 | 0.000 | 3.471 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • RDTEN/0604218N/2345: *FLEET METOC EQUIPMENT* | 2.222 | 2.411 | 2.438 | - | 2.438 | 2.456 | 2.505 | 0.000 | 0.000 | Continuing | Continuing |

**Remarks**

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2341 / *METOC Data Acquisition* |

**D. Acquisition Strategy**

Acquisition, management and contracting strategies are to support the Meteorological and Oceanographic (METOC) Data Acquisition Project to develop, demonstrate, and validate METOC data collection methods and sensors, and to evolve the ability to provide timely and accurate METOC data and products to the Tactical Commander, all with management oversight by the Navy.

**E. Performance Metrics**

Goal: Develop techniques and tools to acquire Meteorological and Oceanographic (METOC) data to improve the accuracy of global and regional scale meteorological and oceanographic forecast models. Wherever applicable, and based on favorable Science & Technology (S&T) assessments, tasks shall leverage or transition existing Small Business Innovative Research and/or RDT&E Budget Activity (BA) 2 and 3 S&T work. Metric -- Tasks will address no less than 75% of applicable capability gaps and requirements.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2341 / *METOC Data Acquisition* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METOC (DATA) Collections | WR | NRL : Washington, DC | 77.695 | 3.237 | Nov 2016 | 0.432 | Nov 2017 | 0.431 | Nov 2018 | - | | 0.431 | Continuing | Continuing | Continuing |
| METOC Future Mission Capabilities | WR | SSC PAC : California | 23.063 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| METOC Future Mission Capabilities | Various | Various : Various | 45.516 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Tactical Oceanography Capabilities / Undersea Warfare (TOC USW) | Various | Various : Various | 5.764 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Littoral Battlespace Sensing - Autonomous Undersea Vehicle | Various | Various : Various | 8.422 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Tactical Oceanography Capabilities / Undersea Warfare (TOC USW) | WR | NSWC : Bethesda, MD | 0.988 | 0.205 | Nov 2016 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| METOC Future Mission Capabilities | C/FP | APPLIED SCIENCE ASSOCIATED : RHODE ISLAND | 0.000 | 0.226 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| METOC (DATA) Collections | C/FP | University of Washington : Seattle, WA | 0.000 | 0.000 | | 0.050 | Nov 2017 | 0.470 | Nov 2018 | - | | 0.470 | Continuing | Continuing | Continuing |
| METOC (DATA) Collections | C/FP | METRON : Reston, VA | 0.000 | 0.000 | | 0.314 | Nov 2017 | 0.110 | Dec 2018 | - | | 0.110 | Continuing | Continuing | Continuing |
| METOC Future Mission Capabilities | C/FP | SAIC : Virginia | 1.481 | 0.300 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| METOC (DATA) Collections | C/FP | Various : Various | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.328 | 0.328 | - |
| METOC Future Mission Capabilities | C/FP | CSC : Virginia | 0.431 | 0.300 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| METOC (DATA) Collections | WR | NRL : Monterry,CA Stennis Space Center, MS | 0.000 | 0.000 | | 1.896 | Nov 2017 | 0.915 | Dec 2018 | - | | 0.915 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2341 / *METOC Data Acquisition* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METOC Future Mission Capabilities | C/CPFF | GDIT : Virginia | 0.138 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| METOC (DATA) Collections | C/FP | Penn State University : PA | 0.000 | 0.000 | | 2.791 | Nov 2017 | 1.545 | Dec 2018 | - | | 1.545 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 163.498 | 4.268 | | 5.483 | | 3.471 | | - | | 3.471 | Continuing | Continuing | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METOC Future Mission Capabilities | C/CPIF | Various : Various | 2.672 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.672 | - |
| Littoral Battlespace Sensing - Autonomous Undersea Vehicle | C/FP | SAIC : Virginia | 0.600 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.600 | - |
| Tactical Oceanography Capabilities / Undersea Warfare (TOC USW) | WR | SSC PAC : California | 0.247 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.247 | - |
| METOC Future Mission Capabilities | C/CPFF | PSS/BAH : California | 0.066 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.066 | - |
| | | **Subtotal** | 3.585 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.585 | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METOC Future Mission Capabilities | Various | Various : Various | 0.200 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.200 | - |
| | | **Subtotal** | 0.200 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.200 | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603207N / *Air/Ocean Tactical Applications* | Project (Number/Name)<br>2341 / *METOC Data Acquisition* | |

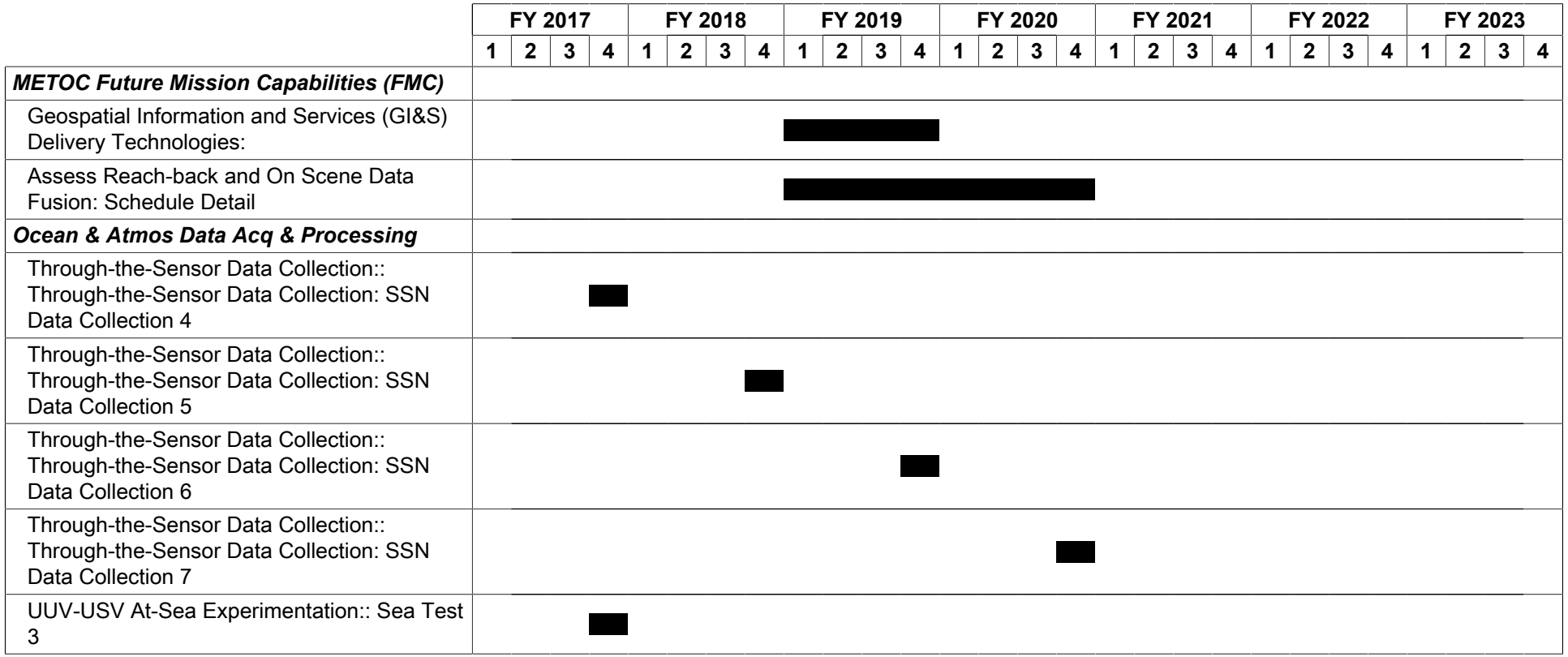
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acquisition Workforce | Various | Not Specified : Not Specified | 0.096 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.096 | - |
| METOC Future Mission Capabilities Management Support | C/FP | BAH : Virginia | 0.400 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.400 | - |
| | | **Subtotal** | 0.496 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.496 | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 167.779 | 4.268 | | 5.483 | | 3.471 | | - | | 3.471 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2341 / *METOC Data Acquisition* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2341 / *METOC Data Acquisition* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***METOC Future Mission Capabilities (FMC)*** | | | | |
| Geospatial Information and Services (GI&S) Delivery Technologies: | 1 | 2019 | 4 | 2019 |
| Assess Reach-back and On Scene Data Fusion: Schedule Detail | 1 | 2019 | 4 | 2020 |
| ***Ocean & Atmos Data Acq & Processing*** | | | | |
| Through-the-Sensor Data Collection:: Through-the-Sensor Data Collection: SSN Data Collection 4 | 4 | 2017 | 4 | 2017 |
| Through-the-Sensor Data Collection:: Through-the-Sensor Data Collection: SSN Data Collection 5 | 4 | 2018 | 4 | 2018 |
| Through-the-Sensor Data Collection:: Through-the-Sensor Data Collection: SSN Data Collection 6 | 4 | 2019 | 4 | 2019 |
| Through-the-Sensor Data Collection:: Through-the-Sensor Data Collection: SSN Data Collection 7 | 4 | 2020 | 4 | 2020 |
| UUV-USV At-Sea Experimentation:: Sea Test 3 | 4 | 2017 | 4 | 2017 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603207N / *Air/Ocean Tactical Applications* | Project (Number/Name)<br>2342 / *METOC Data Assimilation and Mod* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2342: *METOC Data Assimilation and Mod* | 231.124 | 20.082 | 21.111 | 17.441 | - | 17.441 | 21.117 | 21.596 | 21.495 | 22.441 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The Battlespace Data Assimilation and Prediction Project (2342) enables the future warfighter to leverage observed environmental data gathered under Project 2341 (METOC Collections) by assimilating data into and fusing them with sophisticated high-resolution (spatial and temporal) assessment and prediction models made possible by high-performance computing. These models gain increasing importance as weapons and sensors grow in sophistication and complexity, making them all the more sensitive to the effects of the natural environment. Meteorology and Oceanography (METOC) Processing enables full understanding of the limitations and constraints imposed by ocean and atmosphere, in space and time, thus quantifying and minimizing their impact on weapons, sensors and mission. However, METOC Processing itself is limited by the temporal and spatial resolutions at which data are collected and numerically analyzed and predicted. Thus Projects 2341 and 2342 must remain aggressive in delivering higher and higher resolutions, demanding greater and greater computational and database capacities. METOC Processing efforts must also rise to the challenge of assimilating smaller-scale phenomena, particularly in the littorals, and predicting their spatial and temporal effects, as stated by Fleet and Force Commanders who require remote autonomous, clandestine, littoral battlespace sensing in near-shore areas to enable Sea Shield & Sea Basing. This next step in the Information Warfare (IW) Tasking, Collection, Processing, Exploitation and Dissemination (TCPED) continuum, METOC Processing, is critical to fully characterize the physical battlespace environment in real-time and in predictive / forecasting modes, and gives the warfighter a decisive advantage in the complex blue-water, littoral and deep-strike battlespaces.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Meteorological and Oceanographic (METOC) Future Mission Capabilities (FMC) | 4.408 | 0.000 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** FY2018 funding from project unit (PU) 2342 Meteorological and Oceanographic (METOC) Future Mission Capabilities (FMC) realigned to PE 0603207N PU 2342 METOC Data Assimilation and Mod, Battlespace Data Assimilation and Prediction. | | | | | |
| ***FY 2018 Plans:***<br>NA | | | | | |
| ***FY 2019 Base Plans:***<br>N/A | | | | | |
| ***FY 2019 OCO Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2342 / *METOC Data Assimilation and Mod* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A | | | | | |
| ***Title:*** Meteorological and Oceanographic (METOC) Space-Based Sensing Capabilities | 3.544 | 0.000 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** FY2018 funding from project unit 2342 METOC Data Assimilation and Mod, Meteorological and Oceanographic (METOC) Space-Base Sensing Capabilities is realigned to PE 0603207N AIR/OCEAN TACTICAL APPLICATIONS PU 2342 METOC Data Assimilation and Mod, Battlespace Data Assimilation and Prediction. | | | | | |
| ***FY 2018 Plans:***<br>NA | | | | | |
| ***FY 2019 Base Plans:***<br>N/A | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***Title:*** Tactical Oceanographic Capabilities (TOC) / Undersea Warfare (USW) | 2.310 | 0.000 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** FY18 funding from project 2342 sub project Tactical Oceanography Capabilities (TOC)/Undersea Warfare (USW) realigned to PE 0603207N project 2342 METOC Data Assimilation and Mod, sub project Battlespace Data Assimilation and Prediction. | | | | | |
| ***FY 2018 Plans:***<br>NA | | | | | |
| ***FY 2019 Base Plans:***<br>N/A | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***Title:*** Battlespace Data Assimilation and Prediction | 0.000 | 10.389 | 8.443 | 0.000 | 8.443 |
| ***Articles:*** | - | - | - | - | - |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2342 / *METOC Data Assimilation and Mod* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Description:*** The Battlespace Data Assimilation and Prediction Project (2342) enables the future warfighter to leverage observed environmental data gathered under Project 2341 (METOC Collections) by assimilating data into and fusing them with sophisticated high-resolution (spatial and temporal) assessment and prediction models made possible by high-performance computing. These models gain increasing importance as weapons and sensors grow in sophistication and complexity, making them all the more sensitive to the effects of the natural environment. METOC Processing enables full understanding of the limitations and constraints imposed by ocean and atmosphere, in space and time, thus quantifying and minimizing their impact on weapons, sensors and mission. However, METOC Processing itself is limited by the temporal and spatial resolutions at which data are collected and numerically analyzed and predicted. Thus Projects 2341 and 2342 must remain aggressive in delivering higher and higher resolutions, demanding greater and greater computational and database capacities. METOC Processing efforts must also rise to the challenge of assimilating smaller-scale phenomena, particularly in the littorals, and predicting their spatial and temporal effects, as stated by Fleet and Force Commanders who require remote autonomous, clandestine, littoral battlespace sensing in near-shore areas to enable Sea Shield & Sea Basing. This next step in the TCPED continuum, METOC Processing, is critical to fully characterize the physical battlespace environment in real-time and in predictive / forecasting modes, and gives the warfighter a decisive advantage in the complex blue-water, littoral and deep-strike battlespaces.<br><br>FY18 funding realigned to PE 0603207N (Air/Ocean Tactical Applications) project 2342 Battlespace Data Assimilation and Prediction from PE 0603207N (Air/Ocean Tactical Applications) project 2342 Meteorological and Oceanographic (METOC) Future Mission Capabilities (FMC), Meteorological and Oceanographic (METOC) Space-Base Sensing Capabilities and Tactical Oceanography Capabilities (TOC)/Undersea Warfare (USW). This is not a new start<br><br>***FY 2018 Plans:***<br>- Continue: Advance the use of satellite observations targeting battlespace environment characterization, supporting global and mesoscale models currently at resolutions of 5-30km horizontally; with vertical extents from the surface and boundary layer, through the models depth which reaches up to ~80km.<br>- Continue: Advance the capability and forecast skills of the Navy's global numerical weather prediction system NAVGEM and to transition improvements and new technologies into operational NAVGEM.<br>- Continue: Work toward transition of emerging short term (5 day) high-resolution analysis and forecast capabilities to Fleet Numerical Meteorology and Oceanography Center (FNMOC) that address small-scale (meso- and micro-scale) atmospheric, coupled (atmospheric-land-ocean-wave), tropical cyclone, and mesoscale | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2342 / *METOC Data Assimilation and Mod* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ensemble prediction using the current small-scale Coupled Ocean/Atmosphere Mesoscale Prediction System (COAMPS? ).<br>- Continue: Deliver capability to rapidly relocate and exercise a high-resolution coupled air-ocean-wave environmental assimilation and prediction system.<br>- Continue: Improve the passive acoustic model, NSPE, and uBand and provide ongoing NSPE and uBand support to operational community, with special focus on guiding implementation within the Ocean Observing Systems (OOS) Performance Prediction & Mitigation project.<br>- Continue: Work toward transition of product algorithms to improve environmental characterization and tropical cyclone structural and intensity analysis through sensor data visualization, customized imagery, automated sensor data fusion, and automated image analysis.<br>- Continue: Take advantage of real-time spectrum operations (RTSO)-based through-the-sensor (TTS) observations to improve the characterization of the electromagnetic environment.<br>- Continue: Work toward transition of a high resolution global weather prediction system NAVGEM with resolution of approximately T1023L100 (13 km horizontal resolution and 100 vertical layers) that is highly competitive in predictive skill with other operational global NWP systems.<br>- Continue: Work toward transition of a probabilistic tropical cyclone forecasting system, which represents the key uncertainties associated with initial and boundary conditions, based on a COAMPS-TC ensemble and fully integrated into the COAMPS-OS.<br>- Continue: Work toward delivery of a global Naval ocean/ice nowcasting and forecasting capability based on the HYbrid Coordinate Ocean Model (HYCOM) two-way coupled to the Community Ice CodE (CICE) and using the Navy Coupled Ocean Data Assimilation (NCODA) that runs daily at production centers.<br>- Continue: Work toward delivery of an in-situ submarine (BQH-9) capability to produce an estimate of the seabed bottom loss (BL), and deliver data to NAVO for inclusion in the HFBL database.<br>- Continue: Improve the accuracy of Tactical Decision Aids (TDA) acoustic performance calculations in support of surface ship operations by reconciling Fleet sonar data with the Ocean-Atmosphere Master Library (OAML) models and databases, and also starts to test candidate parameterizations for the high-frequency bottom loss (HFBL) database.<br>- Continue: Work toward implementation of new remote sensing data assimilation and determine impacts on NAAPS (aerosol) forecast skill and deliver code to FNMOC.<br>- Continue: Post-process the first moment of NUOPC ensemble forecasts of low-level temperature and humidity, with comparative analysis of EM/EO conditions in raw and bias-corrected grids.<br>- Continue: Prepare the Navy Aerosol Analysis and Prediction System (NAAPS) to run using fields from NAVGEM v2.0. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2342 / *METOC Data Assimilation and Mod* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Continue: Leverage an existing prototype of a probabilistic aerosol forecasting system that has been ported to the Navy DoD Supercomputing Resource Center (DSRC) computers and continue work towards developing it as a quasi- operational system.<br>- Continue: Develop an improved boundary roughness reflection loss (or forward loss) model that will improve accuracy in propagation and reverberation modeling with particular focus on mid frequencies (1-3 kHz).<br>- Begin: Reduce NAVGEM's error in the calculations of the EAAMF, which are provided to the Naval Observatory for calculation of the changes in the length of day (LOD).<br>- Continue: Improve the hydrodynamic and wave prediction capability of the Coupled Atmosphere-Ocean Mesoscale Prediction System (COAMPS) for the coastal ocean (shelf- break to estuarine and surf zone) environment.<br>- Continue: Improve short-term (7day) forecast skill of global and regional scale ocean and coupled numerical weather prediction by transitioning capabilities to derive, assimilate, and evaluate the impact of assimilating sea surface temperature (SST) and ancillary data from satellite retrievals.<br>- Continue: Develop methodologies for retrieval, quality control, and gridded analysis of remotely sensed satellite observations for measurement of latent, sensible, radiation and momentum fluxes.<br>- Continue: Provide mission planners and operators with operationally relevant ocean color data and products.<br>- Continue: Improve short term (5-7 day) forecast skill of sea ice predictions by assimilating current and future satellite derived ice products into the Navy's operational ice forecast systems.<br>- Continue: Migrate the OAML library, administrative, and management functions to a cloud-based approach.<br>- Continue: Improve short-term (7 day) forecast skill of global and regional scale ocean and coupled NWP by transitioning capabilities to NAVOCEANO and other operational centers to assimilate satellite and in situ observations in a manner that realistically projects high resolution altimeter and other surface information into the sparsely sampled ocean interior.<br>- Continue: Provide operational multi-sensor high-resolution satellite visible/near-infrared/infrared (Vis/NIR/IR) and passive microwave (PMW) sea ice concentration retrievals for improved sea ice forecasts and safe navigation in both the Arctic and Antarctic.<br>- Continue: Leverage swell data from the Sentinel-1A satellite to generate a monthly climatology of ocean swell, useful as a first guess of the expected climate in mission-critical regions determined in consultation with Navy forecasters; also leverage output from the global wave model run in hind-cast mode to augment the ocean swell database.<br>- Continue: Work toward transition of a 4DVar (4-Dimensional Variance) data assimilation capability with highly nonlinear ocean circulation regimes such as western boundary currents; test 4DVar with very high resolution configurations of regional domains; estimate an analysis error covariance; initialize an ensemble forecast. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2342 / *METOC Data Assimilation and Mod* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Continue: Improve the state of the art of tropical cyclone (TC) forecast guidance and tactical applications for operational decision makers. | | | | | |
| ***FY 2019 Base Plans:***<br>- Complete: Advance the use of satellite observations targeting battlespace environment characterization, supporting global and mesoscale models currently at resolutions of 5-30km horizontally; with vertical extents from the surface and boundary layer, through the models depth which reaches up to ~80km.<br>- Complete: Advance the capability and forecast skills of the Navy's global numerical weather prediction system NAVGEM and to transition improvements and new technologies into operational NAVGEM.<br>- Complete: Work toward transition of emerging short term (5 day) high-resolution analysis and forecast capabilities to Fleet Numerical Meteorology and Oceanography Center (FNMOC) that address small-scale (meso- and micro-scale) atmospheric, coupled (atmospheric-land-ocean-wave), tropical cyclone, and mesoscale ensemble prediction using the current small-scale Coupled Ocean/Atmosphere Mesoscale Prediction System (COAMPS? ).<br>- Complete: Deliver capability to rapidly relocate and exercise a high-resolution coupled air-ocean-wave environmental assimilation and prediction system.<br>- Complete: Improve the passive acoustic model, NSPE, and uBand and provide ongoing NSPE and uBand support to operational community, with special focus on guiding implementation within the Ocean Observing Systems (OOS) Performance Prediction & Mitigation project.<br>- Complete: Work toward transition of product algorithms to improve environmental characterization and tropical cyclone structural and intensity analysis through sensor data visualization, customized imagery, automated sensor data fusion, and automated image analysis.<br>- Complete: Take advantage of real-time spectrum operations (RTSO)-based through-the-sensor (TTS) observations to improve the characterization of the electromagnetic environment.<br>- Complete: Work toward transition of a high resolution global weather prediction system NAVGEM with resolution of approximately T1023L100 (13 km horizontal resolution and 100 vertical layers) that is highly competitive in predictive skill with other operational global NWP systems.<br>- Complete: Work toward transition of a probabilistic tropical cyclone forecasting system, which represents the key uncertainties associated with initial and boundary conditions, based on a COAMPS-TC ensemble and fully integrated into the COAMPS-OS.<br>- Complete: Work toward delivery of a global Naval ocean/ice nowcasting and forecasting capability based on the Hybrid Coordinate Ocean Model (HYCOM) two-way coupled to the Community Ice Code (CICE) and using the Navy Coupled Ocean Data Assimilation (NCODA) that runs daily at production centers. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2342 / *METOC Data Assimilation and Mod* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Complete: Work toward delivery of an in-situ submarine (BQH-9) capability to produce an estimate of the seabed bottom loss (BL), and deliver data to NAVO for inclusion in the HFBL database.<br>- Complete: Improve the accuracy of Tactical Decision Aids (TDA) acoustic performance calculations in support of surface ship operations by reconciling Fleet sonar data with the Ocean-Atmosphere Master Library (OAML) models and databases, and also starts to test candidate parameterizations for the high-frequency bottom loss (HFBL) database.<br>- Complete: Work toward implementation of new remote sensing data assimilation and determine impacts on NAAPS (aerosol) forecast skill and deliver code to FNMOC.<br>- Complete: Post-process the first moment of NUOPC ensemble forecasts of low-level temperature and humidity, with comparative analysis of EM/EO conditions in raw and bias-corrected grids.<br>- Complete: Prepare the Navy Aerosol Analysis and Prediction System (NAAPS) to run using fields from NAVGEM v2.0.<br>- Complete: Leverage an existing prototype of a probabilistic aerosol forecasting system that has been ported to the Navy DoD Supercomputing Resource Center (DSRC) computers and continue work towards developing it as a quasi- operational system.<br>- Complete: Develop an improved boundary roughness reflection loss (or forward loss) model that will improve accuracy in propagation and reverberation modeling with particular focus on mid frequencies (1-3 kHz).<br>- Continue: Reduce NAVGEM's error in the calculations of the EAAMF, which are provided to the Naval Observatory for calculation of the changes in the length of day (LOD).<br>- Complete: Improve the hydrodynamic and wave prediction capability of the Coupled Atmosphere-Ocean Mesoscale Prediction System (COAMPS) for the coastal ocean (shelf- break to estuarine and surf zone) environment.<br>- Complete: Improve short-term (7day) forecast skill of global and regional scale ocean and coupled numerical weather prediction by transitioning capabilities to derive, assimilate, and evaluate the impact of assimilating sea surface temperature (SST) and ancillary data from satellite retrievals.<br>- Complete: Develop methodologies for retrieval, quality control, and gridded analysis of remotely sensed satellite observations for measurement of latent, sensible, radiation and momentum fluxes.<br>- Complete: Provide mission planners and operators with operationally relevant ocean color data and products.<br>- Complete: Improve short term (5-7 day) forecast skill of sea ice predictions by assimilating current and future satellite derived ice products into the Navy's operational ice forecast systems.<br>- Complete: Migrate the OAML library, administrative, and management functions to a cloud-based approach.<br>- Complete: Improve short-term (7 day) forecast skill of global and regional scale ocean and coupled NWP by transitioning capabilities to NAVOCEANO and other operational centers to assimilate satellite and in situ | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2342 / *METOC Data Assimilation and Mod* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| observations in a manner that realistically projects high resolution altimeter and other surface information into the sparsely sampled ocean interior.<br>- Complete: Provide operational multi-sensor high-resolution satellite visible/near-infrared/infrared (Vis/NIR/IR) and passive microwave (PMW) sea ice concentration retrievals for improved sea ice forecasts and safe navigation in both the Arctic and Antarctic.<br>- Complete: Leverage swell data from the Sentinel-1A satellite to generate a monthly climatology of ocean swell, useful as a first guess of the expected climate in mission-critical regions determined in consultation with Navy forecasters; also leverage output from the global wave model run in hind-cast mode to augment the ocean swell database.<br>- Complete: Work toward transition of a 4DVar (4-Dimensional Variance) data assimilation capability with highly nonlinear ocean circulation regimes such as western boundary currents; test 4DVar with very high resolution configurations of regional domains; estimate an analysis error covariance; initialize an ensemble forecast.<br>- Complete: Improve the state of the art of tropical cyclone (TC) forecast guidance and tactical applications for operational decision makers.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>The funding decrease from FY18 to FY19 in this project is to realign resources to PROJ 3405 which will result in follow-on efforts that more fully address the needs of Fleet and Marine Corps decision makers, and to include technologies that fully integrate state-of-the-art and tactically-relevant atmospheric and ocean modeling capabilities as well as state-of-the-art information technologies such as cloud-based and high-performance computing, as well as "big data analytics" and machine learning. | | | | | |
| ***Title:*** Chief of Naval Operations Speed to Fleet Initiative | 1.058 | 0.000 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** This Speed to Fleet effort will develop a parameterization for the Advanced Propagation Model (APM) electromagnetic energy propagation model to improve modeling of the long range radar performance. This effort will demonstrate the effectiveness of the parameterization and deliver the upgrade to the APM developers for inclusion into future releases of APM to fleet programs. This effort was previously funded in R2A Meteorological and Oceanographic (METOC) Future Mission Capabilities (FMC).<br>***FY 2018 Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2342 / *METOC Data Assimilation and Mod* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| NA<br>***FY 2019 Base Plans:***<br>N/A<br>***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***Title:*** Earth System Prediction Capability (ESPC)<br>***Articles:*** | 8.762<br>- | 10.722<br>- | 8.998<br>- | 0.000<br>- | 8.998<br>- |
| ***Description:*** The Navy Earth System Prediction Capability (ESPC) program will provide a more accurate, longer range, global ocean and atmospheric forecast system for decision support to DoD Maritime Operations through the development of an integrated, coupled atmosphere, ocean, sea ice, land and near-space prediction system with improved deterministic and probabilistic skill over the current operational modeling suite. It will result in increased accuracy for lead times of 1-30 days as well as a new capability for accurate forecasts in the Arctic at all lead times. Additionally it will seek to develop more computationally efficient environmental prediction for emerging architectures and provide Navy R&D support to the National ESPC.<br><br>***FY 2018 Plans:***<br>Continue all efforts from FY2017, less those noted as complete.<br><br>- Characterize forecast dropouts, based on 500mb Anomaly Correlation (AC) methods, in the Navy Global Environmental Model (NAVGEM), including forecast statistics, common properties and causes.<br>- Continue: Develop and implement a fully coupled global atmosphere/wave/ocean/land/ice prediction system providing daily high- resolution deterministic 16-day and lower-resolution ensemble predictions at longer lead times.<br>- Continue: Optimize scripting for the deterministic and ensemble systems to better manage cycling tasks for model components and data assimilation, resulting in increased modularity, better parallelism, easier debugging through error trapping, and greater reuse.<br>- Continue: Develop an ensemble prediction system for a fully coupled global atmosphere / wave / ocean / land / sea ice coupled model for predictions out to 90 days.<br>- Continue: Develop a fully- coupled data assimilation capability to optimize the use of the observations across fluid interfaces, eliminating the transient inconsistences, increasing forecast skill and representing coupled uncertainties. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2342 / *METOC Data Assimilation and Mod* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Continue: Evaluate and demonstrate the capabilities of a new generation of atmospheric dynamical systems that allow for variable resolution on the sphere, are highly scalable, and eliminate or mitigate spurious problems near the poles of the globe.<br>- Continue: Further develop, validate, and evaluate the capability of a fully coupled regional Arctic prediction system.<br>- Continue: Develop, integrate, and test improvements to the computational performance of models within the Navy global coupled forecast system as well as the coupling infrastructure to ensure that operational partners will meet their production schedules using available computational resources.<br>- Continue: Improve capabilities for supporting long range Navy planning (lead times of one week and longer).<br>- Continue: Develop and transition for operational implementation a high resolution global weather prediction system NAVGEM with resolution of approximately T1023L100 (13 km horizontal resolution and 100 vertical layers) that is highly competitive in predictive skill with other operational global NWP systems.<br>- Continue: Define, develop and implement consistent quantitative skill metrics to assess the advancements in the Earth System Prediction Capability (ESPC), taking into account the applications and lead-times for which the ESPC environmental information will be used.<br>- Continue: Evaluate and validate multi-model extended-range forecasts produced from interagency projects such as the North American Multi-model Ensemble (NMME).<br>- Continue: Develop the NAVGEM global model to include inline aerosols to simulate aerosol life cycle and perform aerosol direct radiative heating of the atmosphere.<br>- Continue: Participate in the North American Multi-Model Ensemble (NMME) by re-forecasting the global coupled (NAVGEM-HYCOM-CICE) Navy ESPC model for years 1999 to 2015.<br>- Continue: Accelerate the rate of improvement in the US National Earth System Prediction Capability (ESPC) and National Unified Operational Prediction Capability (NUOPC), focusing primarily on the current and future generation global modeling enterprise.<br>- Continue: Develop the NAVGEM global model to address middle atmosphere processes associated with sudden stratospheric warming and extended range prediction.<br>***FY 2019 Base Plans:***<br>Continue all efforts from FY2018, less those noted as complete.<br><br>- Continue: Characterize forecast dropouts, based on 500mb Anomaly Correlation (AC) methods, in the Navy Global Environmental Model (NAVGEM), including forecast statistics, common properties and causes. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2342 / *METOC Data Assimilation and Mod* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Continue: Develop and implement a fully coupled global atmosphere/wave/ocean/land/ice prediction system providing daily high- resolution deterministic 16-day and lower-resolution ensemble predictions at longer lead times.<br>- Continue: Optimize scripting for the deterministic and ensemble systems to better manage cycling tasks for model components and data assimilation, resulting in increased modularity, better parallelism, easier debugging through error trapping, and greater reuse.<br>- Continue: Develop an ensemble prediction system for a fully coupled global atmosphere / wave / ocean / land / sea ice coupled model for predictions out to 90 days.<br>- Continue: Develop a fully- coupled data assimilation capability to optimize the use of the observations across fluid interfaces, eliminating the transient inconsistences, increasing forecast skill and representing coupled uncertainties.<br>- Continue: Evaluate and demonstrate the capabilities of a new generation of atmospheric dynamical systems that allow for variable resolution on the sphere, are highly scalable, and eliminate or mitigate spurious problems near the poles of the globe.<br>- Continue: Further develop, validate, and evaluate the capability of a fully coupled regional Arctic prediction system.<br>- Continue: Develop, integrate, and test improvements to the computational performance of models within the Navy global coupled forecast system as well as the coupling infrastructure to ensure that operational partners will meet their production schedules using available computational resources.<br>- Continue: Improve capabilities for supporting long range Navy planning (lead times of one week and longer).<br>- Continue: Develop and transition for operational implementation a high resolution global weather prediction system NAVGEM with resolution of approximately T1023L100 (13 km horizontal resolution and 100 vertical layers) that is highly competitive in predictive skill with other operational global NWP systems.<br>- Continue: Define, develop and implement consistent quantitative skill metrics to assess the advancements in the Earth System Prediction Capability (ESPC), taking into account the applications and lead-times for which the ESPC environmental information will be used.<br>- Continue: Evaluate and validate multi-model extended-range forecasts produced from interagency projects such as the North American Multi-model Ensemble (NMME).<br>- Continue: Develop the NAVGEM global model to include inline aerosols to simulate aerosol life cycle and perform aerosol direct radiative heating of the atmosphere.<br>- Continue: Participate in the North American Multi-Model Ensemble (NMME) by re-forecasting the global coupled (NAVGEM-HYCOM-CICE) Navy ESPC model for years 1999 to 2015. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2342 / *METOC Data Assimilation and Mod* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Continue: Accelerate the rate of improvement in the US National Earth System Prediction Capability (ESPC) and National Unified Operational Prediction Capability (NUOPC), focusing primarily on the current and future generation global modeling enterprise.<br>- Continue: Develop the NAVGEM global model to address middle atmosphere processes associated with sudden stratospheric warming and extended range prediction.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>The funding decrease from FY18 to FY19 in this project is to realign resources to PROJ 3405 which will result in follow-on efforts that more fully address the needs of Fleet and Marine Corps decision makers, and to include technologies that fully integrate state-of-the-art and tactically-relevant atmospheric and ocean modeling capabilities as well as state-of-the-art information technologies such as cloud-based and high-performance computing, as well as "big data analytics" and machine learning. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 20.082 | 21.111 | 17.441 | 0.000 | 17.441 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • RDTEN/0604218N/2345: *FLEET METOC EQUIPMENT* | 0.354 | 0.491 | 0.480 | - | 0.480 | 0.458 | 0.467 | 0.000 | 0.000 | Continuing | Continuing |

**Remarks**

**D. Acquisition Strategy**

Acquisition, management and contracting strategies are to support the Meteorological and Oceanographic (METOC) Data Assimilation and Modeling Project to develop, demonstrate, and validate METOC data assimilation and environmental prediction capabilities, enabling timely and accurate delivery of METOC prediction data and products to the Tactical Commander, all with management oversight by the Navy.

**E. Performance Metrics**

Goal: Develop techniques and tools to assimilate Meteorological and Oceanographic (METOC) data in order to improve the accuracy of global and regional scale meteorological and oceanographic forecast models. Data assimilation is expanded to include new in-situ and remotely-sensed data types, based on operational need. Tasks are directed toward advanced software enabling assimilation of disparate sources on non-synoptic time scales. Acoustic, atmospheric, and oceanographic model development, prototyping and transition is focused on improved model physics, increased resolution, and computational efficiency.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2342 / *METOC Data Assimilation and Mod* |

Metric: Tasks will address no less than 75% of applicable capability gaps and requirements.

Goal (ESPC): Develop a more accurate global ocean, atmosphere, wave and sea ice forecast system with longer skillful forecast times from weeks to seasons through integrating and coupling atmosphere, ocean, ice, land and near-space forecast models into a seamless deterministic and ensemble prediction system that significantly improves skill over the current modeling suite. Additionally develop a common modeling architecture to improve cross- Agency collaboration, and greatly more efficient environmental modeling and computational architectures to allow for real-time operational prediction at comparable skill level to international competitors.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603207N / *Air/Ocean Tactical Applications* | Project (Number/Name)<br>2342 / *METOC Data Assimilation and Mod* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METOC Future Mission Capabilities | WR | NRL : Washington DC | 124.331 | 3.626 | Nov 2016 | 0.845 | Nov 2017 | 0.852 | Nov 2018 | - | | 0.852 | Continuing | Continuing | Continuing |
| METOC Future Mission Capabilities | Various | Various : Various | 46.068 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 46.068 | - |
| METOC Space-Based Sensing Capabilities | WR | NRL : Washington, DC | 14.547 | 2.545 | Nov 2016 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Tactical Oceanography Capabilities / Undersea Warfare | WR | NRL : Washington, DC | 8.340 | 1.140 | Nov 2016 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Tactical Oceanography Capabilities / Undersea Warfare | C/FP | University of Texas : TX | 1.163 | 0.000 | | 0.100 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 1.263 | - |
| Tactical Oceanography Capabilities / Undersea Warfare | WR | NSWC Carderock : West Bethesda, MD | 1.640 | 0.450 | Nov 2016 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Tactical Oceanography Capabilities / Undersea Warfare | WR | NAVOCEANO : Mississippi | 0.549 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.549 | - |
| Tactical Oceanography Capabilities / Undersea Warfare | C/FP | University of Washington : Seattle, WA | 0.730 | 0.120 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Tactical Oceanography Capabilities / Undersea Warfare | C/FP | Johns Hopkins University : MD | 0.340 | 0.091 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Tactical Oceanography Capabilities / Undersea Warfare | C/FP | SAIC/QNA : Various | 1.605 | 0.271 | Nov 2016 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| METOC Future Mission Capabilities | C/FP | SAIC/QNA : Various | 2.482 | 0.614 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Tactical Oceanography Capabilities / Undersea Warfare | C/FP | Penn Sate University : Pennsylvania | 0.125 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.125 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2342 / *METOC Data Assimilation and Mod* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tactical Oceanography Capabilities / Undersea Warfare | WR | SSC LANT : North Charleston | 0.050 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.050 | - |
| Tactical Oceanography Capabilities / Undersea Warfare | C/FP | SPA : Virginia | 0.375 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.375 | - |
| METOC SUPPORT SPACE-SOFTWARE DEVELOPMENT | WR | NRL : WASHINGTON DC | 0.000 | 0.515 | Nov 2016 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Tactical Oceanography Capabilities / Undersea Warfare | C/FP | METRON : Virginia | 0.385 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.385 | - |
| Tactical Oceanography Capabilities / Undersea Warfare | C/FP | Vencore : Virginia | 0.239 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.239 | - |
| METOC Battlespace Data Assimilation and Prediction | WR | NRL : Monterey, CAl Stennis Spoace Center,MS | 0.000 | 0.000 | | 8.924 | Nov 2017 | 7.194 | Dec 2018 | - | | 7.194 | 0.000 | 16.118 | - |
| Earth Systems Prediction Capability (ONR) | WR | NRL : Washington DC | 15.883 | 7.431 | Nov 2016 | 8.847 | Nov 2017 | 6.611 | Dec 2018 | - | | 6.611 | Continuing | Continuing | Continuing |
| ESPC | Various | Various : Various | 6.006 | 1.661 | Nov 2016 | 0.681 | Nov 2017 | 0.981 | Dec 2018 | - | | 0.981 | Continuing | Continuing | Continuing |
| CHIEF OF NAVAL OPERATIONS SPEED TO FLEET INITIATIVE | WR | NRL : WASHINGTON DC | 0.000 | 0.850 | Nov 2016 | 0.000 | | 0.000 | | - | | 0.000 | 1.130 | 1.980 | - |
| | | **Subtotal** | 224.858 | 19.314 | | 19.397 | | 15.638 | | - | | 15.638 | Continuing | Continuing | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METOC Future Mission Capabilities | Various | Various : Various | 0.795 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.795 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603207N / *Air/Ocean Tactical Applications* | Project (Number/Name)<br>2342 / *METOC Data Assimilation and Mod* | |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Littoral Battlespace Sensing - Autonomous Undersea Vehicle | C/FP | SAIC : Virginia | 0.473 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.473 | - |
| Tactical Oceanography Capabilities / Undersea Warfare | C/FP | SAIC : Virginia | 0.634 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.634 | - |
| METOC Future Mission Capabilities | C/FP | SAIC : VIRGINIA | 0.000 | 0.115 | Nov 2016 | 0.100 | Nov 2017 | 0.100 | Dec 2018 | - | | 0.100 | Continuing | Continuing | Continuing |
| METOC SUPPORT SPACE-PROGRAM SUPPORT | WR | SSC PACIFIC : SAN DIEGO, CA | 0.000 | 0.090 | Nov 2016 | 0.100 | Nov 2017 | 0.100 | Dec 2018 | - | | 0.100 | Continuing | Continuing | Continuing |
| Earth System Modeling Framework - Common Software Architecture | Various | Various : Boulder, CO; Various | 0.000 | 0.000 | | 0.660 | Nov 2017 | 0.660 | Nov 2018 | - | | 0.660 | 0.000 | 1.320 | - |
| Program Support and Subject Matter Expertise | Various | UW-APL : Seattle, WA | 1.563 | 0.000 | | 0.358 | Nov 2017 | 0.358 | Dec 2018 | - | | 0.358 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 3.465 | 0.205 | | 1.218 | | 1.218 | | - | | 1.218 | Continuing | Continuing | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Data Analytics and Machine Learning | TBD | Charles River : Boston, MA | 0.000 | 0.000 | | 0.234 | Nov 2017 | 0.323 | Dec 2018 | - | | 0.323 | 0.000 | 0.557 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.234 | | 0.323 | | - | | 0.323 | 0.000 | 0.557 | N/A |

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acquisition Workforce | Various | Various : Various | 0.090 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.090 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2342 / *METOC Data Assimilation and Mod* |

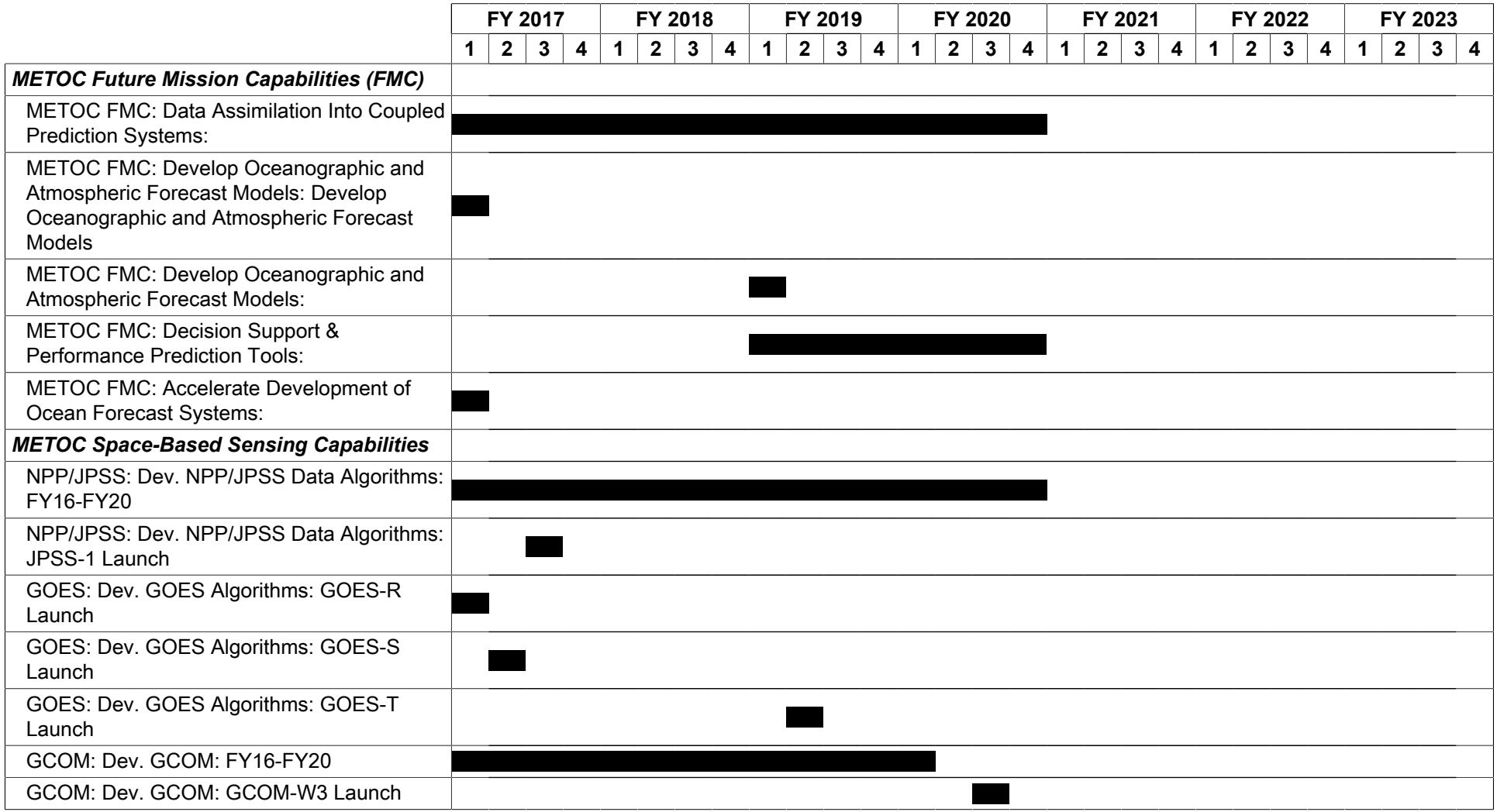
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METOC Space-Based Sensing Capabilities | Various | Various : Various | 1.350 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.350 | - |
| Tactical Oceanography Capabilities / Undersea Warfare | WR | SSC PAC : San Diego, CA | 1.145 | 0.171 | Nov 2016 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| METOC Future Mission Capabilities | C/FP | PSS/BAH : San Diego, CA | 0.216 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.216 | - |
| METOC Space-Based Sensing Capabilities | C/FP | BAH : VIRGINIA | 0.000 | 0.142 | Nov 2016 | 0.100 | Nov 2017 | 0.100 | Nov 2018 | - | | 0.100 | Continuing | Continuing | Continuing |
| METOC Space-Based Sensing Capabilities | WR | SSC PAC : SAN DIEGO, CA | 0.000 | 0.213 | Nov 2016 | 0.100 | Nov 2017 | 0.100 | Nov 2018 | - | | 0.100 | Continuing | Continuing | Continuing |
| METOC Acquisition Management | C/CPFF | PSS/BAH : SAN DIEGO, CA | 0.000 | 0.037 | Nov 2016 | 0.062 | Nov 2017 | 0.062 | Nov 2018 | - | | 0.062 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 2.801 | 0.563 | | 0.262 | | 0.262 | | - | | 0.262 | Continuing | Continuing | N/A |

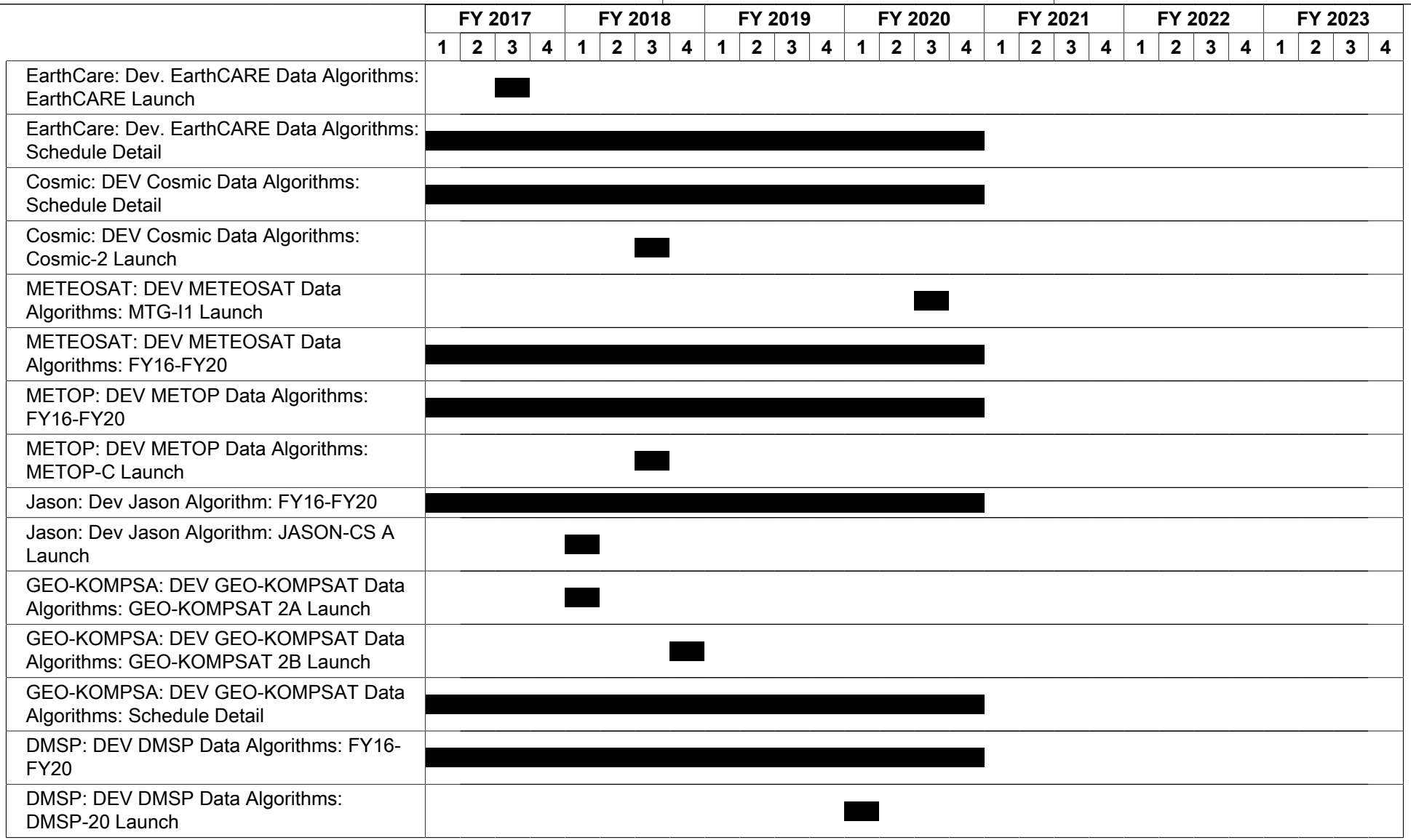
| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 231.124 | 20.082 | | 21.111 | | 17.441 | | - | | 17.441 | Continuing | Continuing | N/A |

**Remarks**

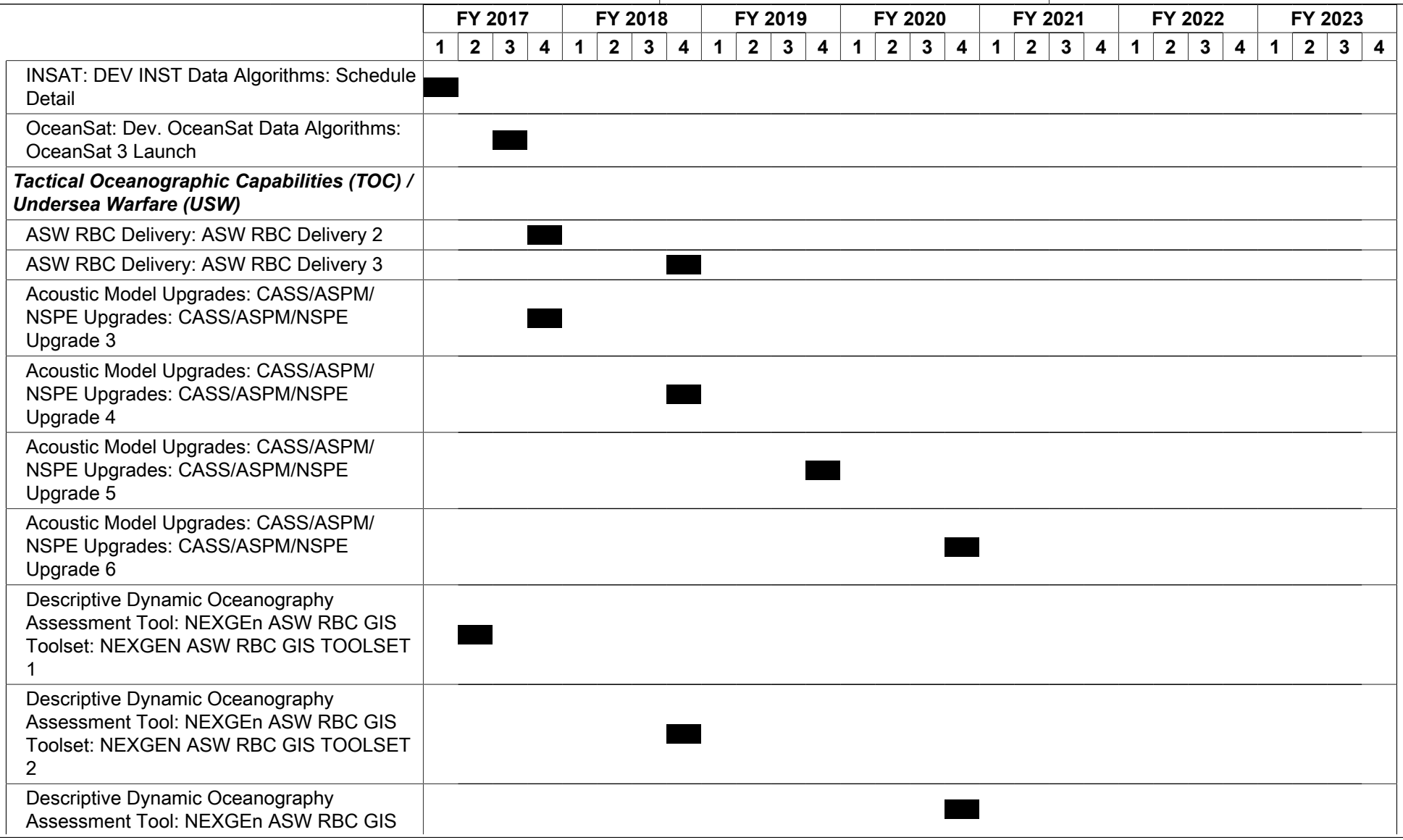
| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2342 / *METOC Data Assimilation and Mod* |



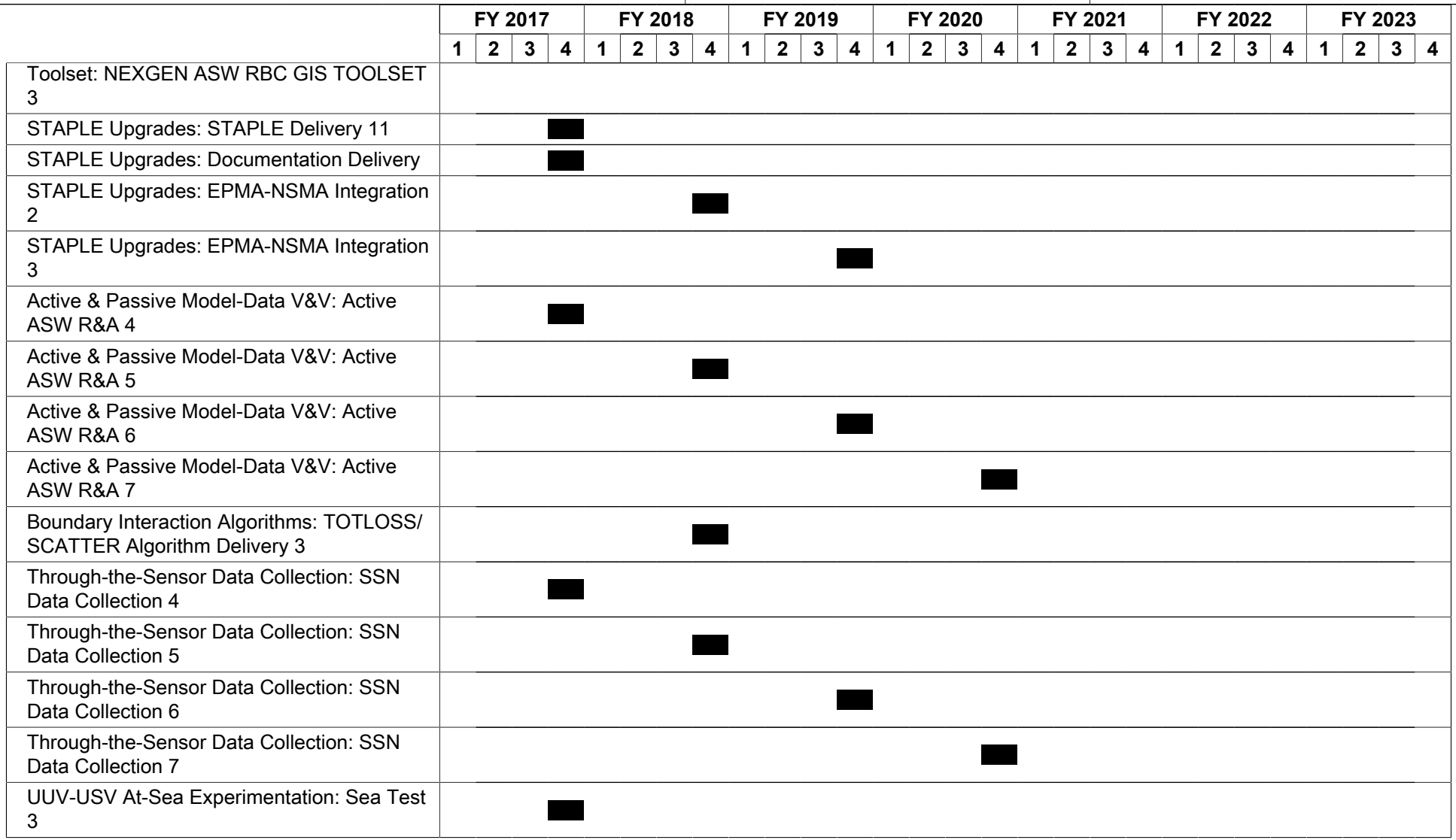
| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2342 / *METOC Data Assimilation and Mod* |



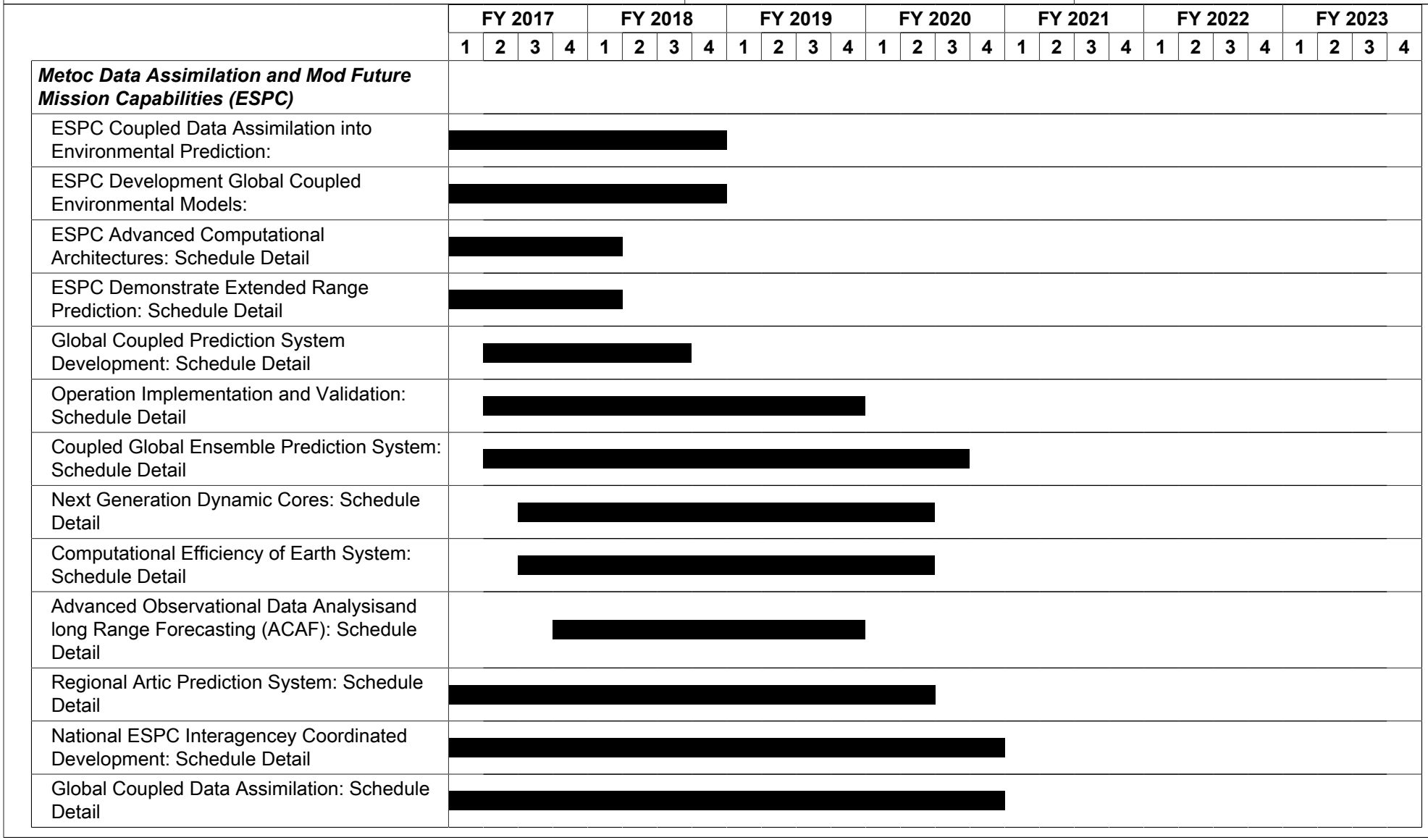
| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2342 / *METOC Data Assimilation and Mod* |



| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2342 / *METOC Data Assimilation and Mod* |



| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2342 / *METOC Data Assimilation and Mod* |



| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2342 / *METOC Data Assimilation and Mod* |

| | FY 2017 | | | | FY 2018 | | | | FY 2019 | | | | FY 2020 | | | | FY 2021 | | | | FY 2022 | | | | FY 2023 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| ***Navy METOC Support (SPACE)*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Navy METOC Support (SPACE): Schedule Detail: Schedule Detail | [redacted] | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2342 / *METOC Data Assimilation and Mod* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***METOC Future Mission Capabilities (FMC)*** | | | | |
| METOC FMC: Data Assimilation Into Coupled Prediction Systems: | 1 | 2017 | 4 | 2020 |
| METOC FMC: Develop Oceanographic and Atmospheric Forecast Models: Develop Oceanographic and Atmospheric Forecast Models | 1 | 2017 | 1 | 2017 |
| METOC FMC: Develop Oceanographic and Atmospheric Forecast Models: | 1 | 2019 | 1 | 2019 |
| METOC FMC: Decision Support & Performance Prediction Tools: | 1 | 2019 | 4 | 2020 |
| METOC FMC: Accelerate Development of Ocean Forecast Systems: | 1 | 2017 | 1 | 2017 |
| ***METOC Space-Based Sensing Capabilities*** | | | | |
| NPP/JPSS: Dev. NPP/JPSS Data Algorithms: FY16-FY20 | 1 | 2017 | 4 | 2020 |
| NPP/JPSS: Dev. NPP/JPSS Data Algorithms: JPSS-1 Launch | 3 | 2017 | 3 | 2017 |
| GOES: Dev. GOES Algorithms: GOES-R Launch | 1 | 2017 | 1 | 2017 |
| GOES: Dev. GOES Algorithms: GOES-S Launch | 2 | 2017 | 2 | 2017 |
| GOES: Dev. GOES Algorithms: GOES-T Launch | 2 | 2019 | 2 | 2019 |
| GCOM: Dev. GCOM: FY16-FY20 | 1 | 2017 | 1 | 2020 |
| GCOM: Dev. GCOM: GCOM-W3 Launch | 3 | 2020 | 3 | 2020 |
| EarthCare: Dev. EarthCARE Data Algorithms: EarthCARE Launch | 3 | 2017 | 3 | 2017 |
| EarthCare: Dev. EarthCARE Data Algorithms: Schedule Detail | 1 | 2017 | 4 | 2020 |
| Cosmic: DEV Cosmic Data Algorithms: Schedule Detail | 1 | 2017 | 4 | 2020 |
| Cosmic: DEV Cosmic Data Algorithms: Cosmic-2 Launch | 3 | 2018 | 3 | 2018 |
| METEOSAT: DEV METEOSAT Data Algorithms: MTG-I1 Launch | 3 | 2020 | 3 | 2020 |
| METEOSAT: DEV METEOSAT Data Algorithms: FY16-FY20 | 1 | 2017 | 4 | 2020 |
| METOP: DEV METOP Data Algorithms: FY16-FY20 | 1 | 2017 | 4 | 2020 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2342 / *METOC Data Assimilation and Mod* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| METOP: DEV METOP Data Algorithms: METOP-C Launch | 3 | 2018 | 3 | 2018 |
| Jason: Dev Jason Algorithm: FY16-FY20 | 1 | 2017 | 4 | 2020 |
| Jason: Dev Jason Algorithm: JASON-CS A Launch | 1 | 2018 | 1 | 2018 |
| GEO-KOMPSA: DEV GEO-KOMPSAT Data Algorithms: GEO-KOMPSAT 2A Launch | 1 | 2018 | 1 | 2018 |
| GEO-KOMPSA: DEV GEO-KOMPSAT Data Algorithms: GEO-KOMPSAT 2B Launch | 4 | 2018 | 4 | 2018 |
| GEO-KOMPSA: DEV GEO-KOMPSAT Data Algorithms: Schedule Detail | 1 | 2017 | 4 | 2020 |
| DMSP: DEV DMSP Data Algorithms: FY16-FY20 | 1 | 2017 | 4 | 2020 |
| DMSP: DEV DMSP Data Algorithms: DMSP-20 Launch | 1 | 2020 | 1 | 2020 |
| INSAT: DEV INST Data Algorithms: Schedule Detail | 1 | 2017 | 1 | 2017 |
| OceanSat: Dev. OceanSat Data Algorithms: OceanSat 3 Launch | 3 | 2017 | 3 | 2017 |
| ***Tactical Oceanographic Capabilities (TOC) / Undersea Warfare (USW)*** | | | | |
| ASW RBC Delivery: ASW RBC Delivery 2 | 4 | 2017 | 4 | 2017 |
| ASW RBC Delivery: ASW RBC Delivery 3 | 4 | 2018 | 4 | 2018 |
| Acoustic Model Upgrades: CASS/ASPM/NSPE Upgrades: CASS/ASPM/NSPE Upgrade 3 | 4 | 2017 | 4 | 2017 |
| Acoustic Model Upgrades: CASS/ASPM/NSPE Upgrades: CASS/ASPM/NSPE Upgrade 4 | 4 | 2018 | 4 | 2018 |
| Acoustic Model Upgrades: CASS/ASPM/NSPE Upgrades: CASS/ASPM/NSPE Upgrade 5 | 4 | 2019 | 4 | 2019 |
| Acoustic Model Upgrades: CASS/ASPM/NSPE Upgrades: CASS/ASPM/NSPE Upgrade 6 | 4 | 2020 | 4 | 2020 |
| Descriptive Dynamic Oceanography Assessment Tool: NEXGEn ASW RBC GIS Toolset: NEXGEN ASW RBC GIS TOOLSET 1 | 2 | 2017 | 2 | 2017 |
| Descriptive Dynamic Oceanography Assessment Tool: NEXGEn ASW RBC GIS Toolset: NEXGEN ASW RBC GIS TOOLSET 2 | 4 | 2018 | 4 | 2018 |
| Descriptive Dynamic Oceanography Assessment Tool: NEXGEn ASW RBC GIS Toolset: NEXGEN ASW RBC GIS TOOLSET 3 | 4 | 2020 | 4 | 2020 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2342 / *METOC Data Assimilation and Mod* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| STAPLE Upgrades: STAPLE Delivery 11 | 4 | 2017 | 4 | 2017 |
| STAPLE Upgrades: Documentation Delivery | 4 | 2017 | 4 | 2017 |
| STAPLE Upgrades: EPMA-NSMA Integration 2 | 4 | 2018 | 4 | 2018 |
| STAPLE Upgrades: EPMA-NSMA Integration 3 | 4 | 2019 | 4 | 2019 |
| Active & Passive Model-Data V&V: Active ASW R&A 4 | 4 | 2017 | 4 | 2017 |
| Active & Passive Model-Data V&V: Active ASW R&A 5 | 4 | 2018 | 4 | 2018 |
| Active & Passive Model-Data V&V: Active ASW R&A 6 | 4 | 2019 | 4 | 2019 |
| Active & Passive Model-Data V&V: Active ASW R&A 7 | 4 | 2020 | 4 | 2020 |
| Boundary Interaction Algorithms: TOTLOSS/SCATTER Algorithm Delivery 3 | 4 | 2018 | 4 | 2018 |
| Through-the-Sensor Data Collection: SSN Data Collection 4 | 4 | 2017 | 4 | 2017 |
| Through-the-Sensor Data Collection: SSN Data Collection 5 | 4 | 2018 | 4 | 2018 |
| Through-the-Sensor Data Collection: SSN Data Collection 6 | 4 | 2019 | 4 | 2019 |
| Through-the-Sensor Data Collection: SSN Data Collection 7 | 4 | 2020 | 4 | 2020 |
| UUV-USV At-Sea Experimentation: Sea Test 3 | 4 | 2017 | 4 | 2017 |
| ***Metoc Data Assimilation and Mod Future Mission Capabilities (ESPC)*** | | | | |
| ESPC Coupled Data Assimilation into Environmental Prediction: | 1 | 2017 | 4 | 2018 |
| ESPC Development Global Coupled Environmental Models: | 1 | 2017 | 4 | 2018 |
| ESPC Advanced Computational Architectures: Schedule Detail | 1 | 2017 | 1 | 2018 |
| ESPC Demonstrate Extended Range Prediction: Schedule Detail | 1 | 2017 | 1 | 2018 |
| Global Coupled Prediction System Development: Schedule Detail | 2 | 2017 | 3 | 2018 |
| Operation Implementation and Validation: Schedule Detail | 2 | 2017 | 4 | 2019 |
| Coupled Global Ensemble Prediction System: Schedule Detail | 2 | 2017 | 3 | 2020 |
| Next Generation Dynamic Cores: Schedule Detail | 3 | 2017 | 2 | 2020 |
| Computational Efficiency of Earth System: Schedule Detail | 3 | 2017 | 2 | 2020 |
| Advanced Observational Data Analysisand long Range Forecasting (ACAF): Schedule Detail | 4 | 2017 | 4 | 2019 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2342 / *METOC Data Assimilation and Mod* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Regional Artic Prediction System: Schedule Detail | 1 | 2017 | 2 | 2020 |
| National ESPC Interagencey Coordinated Development: Schedule Detail | 1 | 2017 | 4 | 2020 |
| Global Coupled Data Assimilation: Schedule Detail | 1 | 2017 | 4 | 2020 |
| ***Navy METOC Support (SPACE)*** | | | | |
| Navy METOC Support (SPACE): Schedule Detail: Schedule Detail | 1 | 2017 | 1 | 2020 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603207N / *Air/Ocean Tactical Applications* | Project (Number/Name)<br>2343 / *Tactical METOC Applications* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2343: *Tactical METOC Applications* | 153.449 | 10.275 | 11.715 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 175.439 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

Total funding control for Fleet Meteorology & Oceanography (METOC) Equipment (2343) in FY19 and beyond was moved from Program Element (PE) 0603207N into PE 0604218N Air Ocean Equipment Engineering Projects as a result of a Budget Activity (BA) reclassification.

**A. Mission Description and Budget Item Justification**

The Tactical Meteorology and Oceanography (METOC) Applications Project provides cyber secure operational effects decision aid capabilities for Navy and Marine Corps warfighters in the context of Joint Operations in a net-centric environment. This project funds the agile software development of the Naval Integrated Tactical Environmental System Next Generation (NITES-Next) program of record. NITES-Next program identifies and transitions state-of-the-art decision support software technologies from the government and commercial industry's technology base, and then demonstrates and validates these capabilities before fielding. These software decision support tools provide platform, sensor, communications, and weapon systems performance assessments for warfighters in terms of their littoral and deep-strike battlespace environments. These assessments allow mission planners and warfighters, from Unit to Theater level, to optimize their sensor employment on airborne, surface, and subsurface platforms in support of Naval Composite Warfare mission areas including Undersea Warfare (USW), Anti-Submarine Warfare (ASW), Mine Warfare (MIW), Amphibious Warfare (AMW), Anti-Surface Warfare (ASUW), Anti-Air Warfare (AAW), Strike Warfare (STW), Expeditionary Warfare (EXW), Electronic Warfare (EW), Information Operations (IO), Intelligence Operations (INT), Non-Combat Operations (NCO), Command, Control, Communication (CCC), and Naval Special Warfare (NSW). Performance assessments leading to improvements in operational and tactical control are conducted through a two-tiered approach: 1) Meteorological and Oceanographic (METOC) Decision Aids and, 2) Operational Effects Decision Aids (OEDAs). METOC Decision Aides consist of a series of analysis tools which characterize the physical environment conditions of the battlespace based on the best set of physical environment data available at the time (i.e., some combination of historical and/or real-time (or near real-time) in-situ, and numerically modeled forecast data). OEDAs use the METOC Decision Aide information by fusing it with relevant, often-classified, sensor and target data to predict how weapons and sensor systems will perform. Performance results are displayed in tabular and graphic formats integrated into net-centric visualization tools for use by mission planners, and combat/weapon system operators to develop localization plans, USW/AAW/ASUW screens, STW profiles, and AMW ingress and egress points. METOC Decision Aides and OEDAs typically use data derived from sensors developed in Project 2341 (METOC Data Acquisition) and assimilated by software produced by Project 2342 (METOC Data Assimilation and Modeling). METOC Decision Aides and OEDAs also use data obtained through direct interfaces to Navy combat systems. Cyber secure capabilities are a current emphasis required to characterize and/or predict sensor and weapons system performance in the highly complex littoral environments in support of regional conflict scenarios. It addresses multi-warfare areas, particularly shallow water ASW, NSW, and missile and air defense/strike capabilities.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2343 / *Tactical METOC Applications* |

Funding supports development and integration efforts for Meteorological and Oceanographic (METOC) systems to generate and collect METOC data and fuse multiple intelligence inputs to more robustly characterize and predict tactical atmospheric and oceanographic conditions. This integrated METOC picture will support real-time battlespace awareness of propagation conditions affecting signals across the electromagnetic spectrum. METOC data will be fused with other intelligence data and automatically provided to shipboard combat systems to inform kinetic and non-kinetic fires.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Naval Integrated Tactical Environmental System Next Generation (NITES-Next) | 10.275 | 11.715 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Naval Integrated Tactical Environmental System Next Generation (NITES-Next) will continue working on the Fleet Capability Release (FCR)-2 (v2.0.2) Task Order in support of deployment in FY19/20, and also award the FCR-3 Task Order. The program will conduct a FCR-3 Build Technical Review (BTR) and seek to obtain a FCR-3 Building Decision (BD) from the Milestone Decision Authority (MDA). NITES-Next will begin initial software development of FCR 3 mobile variant, which integrates new mobile variant requirements with the previous afloat versions of FCR 2.x. The FCR-3 mobile variant software will also include anti-tamper proofing and will be releasable to our allies to enhance our interoperability with their information warfare systems. The new mobile variant will replace the current NITES-NEXT Naval Integrated Tactical Environmental System Fielded (NITES-Fielded) suite of systems that have been determined to have cyber vulnerabilities and need to be retired as soon as possible. Additionally, FCR-3 will accelerate/include the development of an Electromagnetic (EM) Prediction capability to be delivered in FY19/20. NITES-Next will plan for, and conduct, System Integration Testing (SIT), System Qualification Testing(SQT), User Assessment (UA), and Developmental Test and Evaluation (DT&E) for FCR-2 (v2.0.2) and FCR-3. NITES-Next will begin deployment of FCR-2 (v2.0.1) software. The program will obtain an Authority to Operate (ATO) for Fleet Capability Release (FCR)-2.x and FCR-3 software. The program will continue planning for the FCR-4 development and contracting activities (including updating of all required documentation, Requirements Development Package (RDP), Cost Analysis Requirements Document (CARD), Program Life Cycle Cost Estimate (PLCCE)). NITES-Next will continue using Amazon Web Services (AWS) cloud computing infrastructure to support Fleet operator training. | | | | | |
| ***FY 2019 Base Plans:***<br>N/A | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2343 / *Tactical METOC Applications* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Total funding control for Fleet Meteorology & Oceanography (METOC) Equipment (2343) in FY19 and beyond was moved from Program Element (PE) 0603207N into PE 0604218N as a result of a Budget Activity (BA) reclassification. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 10.275 | 11.715 | 0.000 | 0.000 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The NITES-Next program acquisition, management and contracting strategies are to support the Tactical Meteorology & Oceanography (METOC) Applications project to continue the development of state-of-the-art software capabilities that provide sensor, communication, and weapon system performance assessment capabilities for open ocean and littoral operating environments. The Department of the Navy (DoN) maintains management oversight of the Naval Integrated Tactical Environmental System Next Generation (NITES-Next) program's acquisition and contracting strategies. The Department of the Navy (DoN) requirements for the Naval Integrated Tactical Environmental System Next Generation (NITES-Next) program's acquisition and contracting strategies are based on approved Joint Capabilities Integration and Development System (JCIDS) documentation.

**E. Performance Metrics**

Goal: Field software decision aid capabilities for Navy and Marine Corps war fighters in order to facilitate the characterization and prediction of the physical environment in the battlespace.

Metric: Meet the performance metrics identified in approved NITES-Next Program's requirements documents (e.g., Concept Definition Document (CDD) and individual Requirements Definition Packages (RDPs)).

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603207N / *Air/Ocean Tactical Applications* | Project (Number/Name)<br>2343 / *Tactical METOC Applications* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Product Development Prior Year | Various | Various : Various | 117.115 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 117.115 | - |
| NITES-Next | WR | SSC Pacific : San Diego, CA | 19.734 | 4.212 | Oct 2016 | 3.758 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 27.704 | - |
| NITES-Next | C/FP | SAIC : Virginia | 7.444 | 2.472 | Feb 2017 | 2.051 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 11.967 | - |
| NITES-Next | WR | SSC Atlantic : South Carolina | 0.271 | 0.105 | Apr 2017 | 0.087 | Oct 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.463 | - |
| NITES-Next / Engineering | C/IDIQ | NAVSUP : Pennsylvania | 0.000 | 1.300 | May 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.300 | - |
| NITES-Next / Engineering | C/IDIQ | SSC Pacific : Various | 0.000 | 0.225 | Jul 2017 | 3.791 | May 2018 | 0.000 | | - | | 0.000 | 0.000 | 4.016 | - |
| | | **Subtotal** | 144.564 | 8.314 | | 9.687 | | 0.000 | | - | | 0.000 | 0.000 | 162.565 | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Support Prior Year | Various | Various : Various | 0.720 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.720 | - |
| NITES-Next | C/FP | SAIC : Virginia | 5.224 | 1.191 | Feb 2017 | 1.232 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 7.647 | - |
| | | **Subtotal** | 5.944 | 1.191 | | 1.232 | | 0.000 | | - | | 0.000 | 0.000 | 8.367 | N/A |

**Management Services ($ in Millions)**

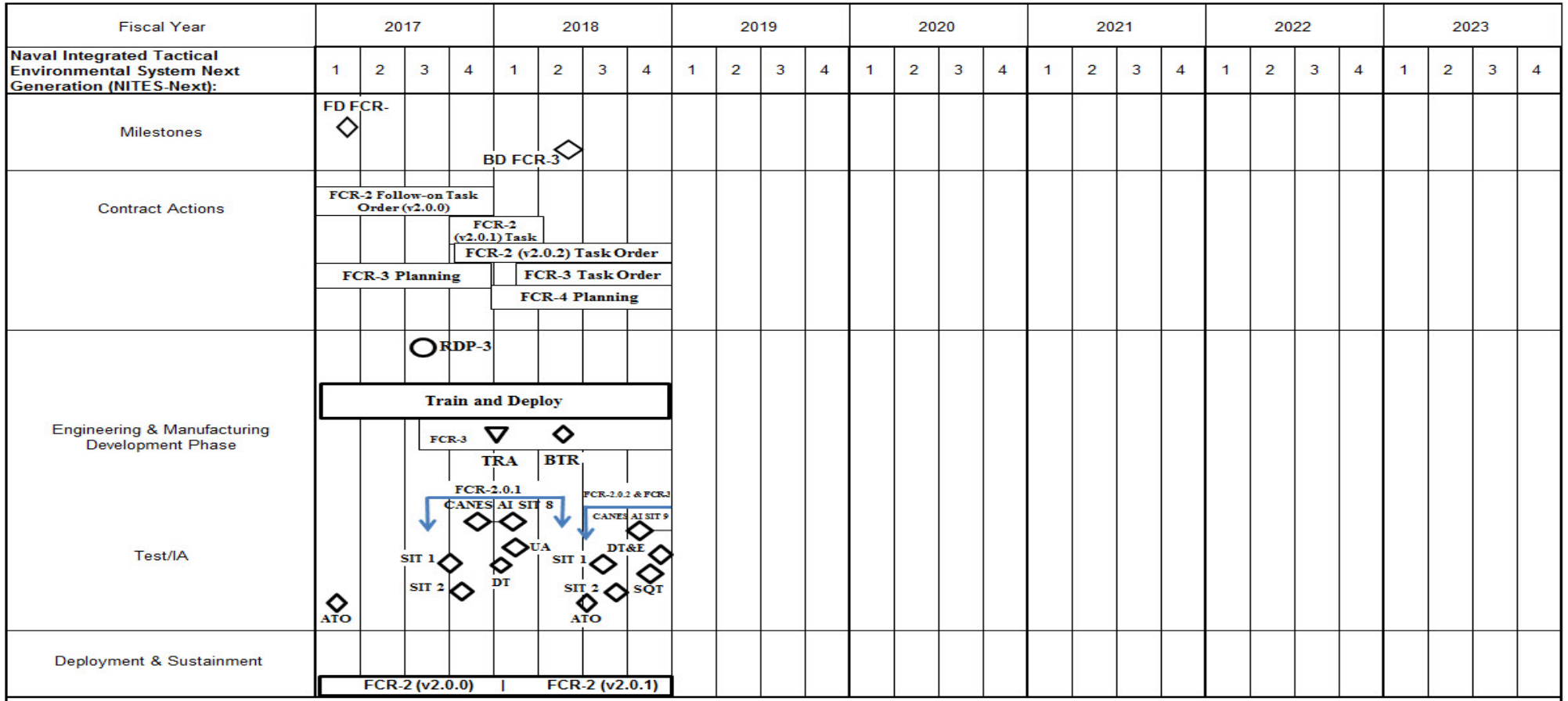
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Management Services Prior Year | Various | Various : Various | 0.031 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.031 | - |
| NITES-Next | WR | SSC Pacific : San Diego, CA | 1.140 | 0.293 | Oct 2016 | 0.303 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 1.736 | - |
| NITES-Next | C/FP | BAH : San Diego, CA | 1.770 | 0.477 | Dec 2016 | 0.493 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 2.740 | - |
| | | **Subtotal** | 2.941 | 0.770 | | 0.796 | | 0.000 | | - | | 0.000 | 0.000 | 4.507 | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603207N / *Air/Ocean Tactical Applications* | Project (Number/Name)<br>2343 / *Tactical METOC Applications* | |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 153.449 | 10.275 | | 11.715 | | 0.000 | | - | | 0.000 | 0.000 | 175.439 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2343 / *Tactical METOC Applications* |




Acronyms: OTRR = Opertional Test Readiness Review. RDP = Requirements Definition Package. FCR = Fleet Capability Release. TRA = Technology Readiness Assessment. BD = Build Decision. FD = Fielding Decision. Limited Fielding Decision = LFD. IOC= Initial Operational Capability. IATO = Interim Authority to Operate. ATO = Authority to Operate. UA = User Assessment. BTR = Build Technical Review. Field Technical Reivew = FTR. SIT = System Integration Test. RALOT = Risk Assessment Level of Testing. DT&E = Developmental Test & Evaluation. ADM - Acquisition Decision Memorandum. SOVT = System Verification Operational Test. CANES = Consolidated Afloat Networks and Enterprise Services. AI = Application Integration.

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2343 / *Tactical METOC Applications* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Naval Integrated Tactical Environmental System Next Generation (NITES-Next)*** | | | | |
| Milestones: Build Decision (BD) Fleet Capability Release - 3 | 2 | 2018 | 2 | 2018 |
| Milestones: Fielding Decision (FD) Fleet Capability Release - 2 | 1 | 2017 | 1 | 2017 |
| Contract Actions: FCR-2 Follow On Task Order (v2.0.0) | 1 | 2017 | 4 | 2017 |
| Contract Actions: FCR-2 Task Order (v2.0.1) | 4 | 2017 | 2 | 2018 |
| Contract Actions: FCR-2 Task Order (v2.0.2) | 4 | 2017 | 4 | 2018 |
| Contract Actions: FCR-3 Task Order | 1 | 2018 | 4 | 2018 |
| Contract Actions: FCR-3-Planning | 1 | 2017 | 4 | 2017 |
| Contract Actions: FCR-4 Planning | 4 | 2017 | 4 | 2018 |
| Engineering & Manufacturing Development Phase: Fleet Capability Release - 2 / Train Deploy | 1 | 2017 | 4 | 2018 |
| Engineering & Manufacturing Development Phase: Fleet Capability Release - 3 / Train Deploy | 3 | 2017 | 4 | 2018 |
| Engineering & Manufacturing Development Phase: Requirements Definition Package - 3 | 3 | 2017 | 3 | 2017 |
| Engineering & Manufacturing Development Phase: Technology Readiness Assessment - 3 | 1 | 2018 | 1 | 2018 |
| Test/IA: Fleet Capability Release - 2 | 3 | 2017 | 2 | 2018 |
| Test/IA: Fleet Capability Release - 3 | 3 | 2018 | 4 | 2018 |
| Test/IA: System Integration Test - 1 (FCR-2) | 3 | 2017 | 3 | 2017 |
| Test/IA: System Integration Test - 2 (FCR-2) | 4 | 2017 | 4 | 2017 |
| Test/IA: System Integration Test - 1 (FCR-3) | 3 | 2018 | 3 | 2018 |
| Test/IA: System Integration Test - 2 (FCR-3) | 3 | 2018 | 3 | 2018 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2343 / *Tactical METOC Applications* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Test/IA: Authority to Operate FCR-2.0.1 | 1 | 2017 | 1 | 2017 |
| Test/IA: Authority to Operate FCR-2.0.2 | 3 | 2018 | 3 | 2018 |
| Test/IA: System Qualification Test FCR-3 | 4 | 2018 | 4 | 2018 |
| Test/IA: Developmental Test Fleet Capability Release - FCR-2 | 1 | 2018 | 1 | 2018 |
| Test/IA: Developmental Test Fleet Capability Release - FCR-3 | 4 | 2018 | 4 | 2018 |
| Test/IA: User Assessment FCR-2 | 1 | 2018 | 1 | 2018 |
| Test/IA: CANES AI SIT FCR-2 | 4 | 2017 | 1 | 2018 |
| Test/IA: CANES AI SIT FCR-3 | 4 | 2018 | 4 | 2018 |
| Test/IA: Deployment and Sustainment: Deployment, fielding and Sustainment (OMN) | 1 | 2017 | 4 | 2018 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603207N / *Air/Ocean Tactical Applications* | Project (Number/Name)<br>2344 / *Precise Time and Astrometry* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2344: *Precise Time and Astrometry* | 10.689 | 4.844 | 5.190 | 4.556 | - | 4.556 | 2.946 | 3.006 | 3.017 | 3.079 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The Precise Timing and Astrometry (PTA) project funds research and development of improvements for the U.S. Master Clock (MC) System, the DoD Time Transfer capability, the Earth Orientation System, and the Astrometric Observation System. The MC System and Time Transfer provides precise time for use in modern military and National Technical Means (NTM) navigation, guidance, positioning, and tracking systems. The Earth Orientation System provides precise Earth Orientation Parameters for use by the DoD and the national civilian infrastructure to establish the specific orientation of the Earth and to provide input to the terrestrial reference frame. The Astrometric Observation System provides the basic data needed to generate the Celestial Reference Frame (CRF) which is the standard for calibrating all inertial navigation systems, satellite orbits, and earth rotation determinations. Improvement to the MC System, Time Transfer, Earth Orientation, and Astrometric Observation Systems are needed to ensure that new and upgraded DoD and NTM capabilities meet their performance requirements. By DoD Directive, the U.S. Naval Observatory (USNO), Washington, D.C., is responsible for coordinating Precise Time and Time Interval (PTTI) requirements and for maintaining a PTTI reference standard (astronomical and atomic) for use by all DoD, Federal agencies, and related scientific laboratories.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Precise Timing and Astronomy | 4.844 | 5.190 | 4.556 | 0.000 | 4.556 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Research and development of improvements for the U.S. Master Clock (MC) System, the DoD Time Transfer capability, the Earth Orientation System, and the Astrometric Observation System. | | | | | |
| ***FY 2018 Plans:***<br>*Field operational Optical Fiber timing link in DC metro area<br>*Lab demonstration of Optical clock prototype<br>*Critical Time Dissemination Activities<br>*Transition Earth Orientation Parameters (EOP) automation products to operations (Initial Operating Capability, IOC)<br>*Begin 1.8m telescope enclosure at Naval Observatory Flagstaff Station<br>*Test GPS-denied reference frame data pipeline<br>*Preliminary Design Review (PDR) for transceiver for next generation time transfer | | | | | |
| ***FY 2019 Base Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2344 / *Precise Time and Astrometry* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| *Critical Design Review (CDR) for transceiver for next generation time transfer<br>*Transition Earth Orientation Parameters (EOP) automation products to operations (Final Operating Capability, FOC)<br>*Transition GPS-denied reference frame data pipeline to operations<br>*Solar Lunar Almanac Core (SLAC) Shapiro illuminance model study/upgrade<br>*System Requirements Review (SRR) for next generation infrared astrometric camera<br>*Initiate development of prototype optical lattice clock (begin materials study)<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>The decrease in funding from FY2018 to FY2019 is due to reduced investment in the next generation Master Clock and work on Earth Orientation Parameter (EOP) Optimization and Celestial Reference Frame (CRF) next generation instrumentation. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 4.844 | 5.190 | 4.556 | 0.000 | 4.556 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The included technology developments are primarily in-house with selected contractor participation. However, the Kokee Park, HI, radio telescope upgrade and the SW Correlator contract will involve substantial non-Navy contract support.

**E. Performance Metrics**

(1) The Software Correlator will complete Phase 2 and will achieve Initial Operational Capability (IOC).
(2) FOC for antenna at Kokee Park, HI.
(3) Rb Fountain System will reach FOC at AMC in FY18.
(4) Delivery of first Next Generation Time Transfer transciever--transition to operations.
(5) 1.8 meter Enclosure Fabrication

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603207N / *Air/Ocean Tactical Applications* | Project (Number/Name)<br>2344 / *Precise Time and Astrometry* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Primary Hardware Development (NPOI) 1.8m Telescope Project (1) | SS/FFP | Lowell Observatory : Flagstaff, AZ | 0.000 | 0.200 | Mar 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.200 | - |
| Primary Hardware Development (NPOI) 1.8m Telescope (2) | SS/FFP | AZ Embeded System : Not Specified | 0.300 | 0.200 | Aug 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.500 | - |
| Ancillary Hardware Development 1 | Various | U.S. Naval Observatory : Washington, DC | 0.085 | 0.070 | Dec 2016 | 0.022 | Dec 2017 | 0.044 | Dec 2018 | - | | 0.044 | 0.000 | 0.221 | - |
| Ancillary Hardware Development 2 | Various | U.S. Naval Observatory : Washington, DC | 0.084 | 0.070 | Jan 2017 | 0.022 | Jan 2018 | 0.035 | Jan 2019 | - | | 0.035 | 0.000 | 0.211 | - |
| Ancillary Hardware Development 3 | Various | U.S. Naval Observatory : Washington, DC | 0.122 | 0.070 | Apr 2017 | 0.022 | Apr 2018 | 0.035 | Apr 2019 | - | | 0.035 | 0.000 | 0.249 | - |
| Ancillary Hardware Development 4 | Various | U.S. Naval Observatory : Washington, DC | 0.027 | 0.070 | Jul 2017 | 0.022 | Jul 2018 | 0.035 | Jul 2019 | - | | 0.035 | 0.000 | 0.154 | - |
| Primary Hardware Development for CTD (System Integration) | C/FP | Classified : Not Specified | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | - |
| Primary Hardware Development for CTD (RF Interface) | MIPR | Classified : Not Specified | 2.980 | 2.000 | Mar 2017 | 0.780 | Mar 2018 | 0.000 | | - | | 0.000 | 0.000 | 5.760 | - |
| Primary Hardware Development for CTD (Line Interface) | MIPR | Classified : Not Specified | 2.219 | 0.000 | | 1.000 | Mar 2018 | 0.000 | | - | | 0.000 | 0.000 | 3.219 | - |
| Primary Hardware Development for CTD (Reference Upgrade) | C/FFP | Symmetricom : San Jose, CA | 0.250 | 0.150 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.400 | - |
| Next Generation Secure Time Transfer | C/FFP | Classified : Not Specified | 0.434 | 0.500 | Jul 2017 | 0.273 | Mar 2018 | 0.500 | Mar 2019 | - | | 0.500 | 0.565 | 2.272 | - |
| 1.8 meter infrared camera development | C/FFP | Classified : Not Specified | 0.000 | 0.000 | | 0.000 | | 1.000 | Jun 2019 | - | | 1.000 | 4.249 | 5.249 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603207N / *Air/Ocean Tactical Applications* | Project (Number/Name)<br>2344 / *Precise Time and Astrometry* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Primary Hardware Development (Site Prep) | TBD | NASA/GSFC : HI | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | - |
| Primary Hardware Development (Antenna Receiver Electronics) | C/FFP | NASA : GSFC | 1.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.000 | - |
| 1.8 meter Telescope Enclosure | C/FFP | NAVFAC SW : Not Specified | 0.000 | 0.000 | | 1.800 | Jun 2018 | 0.000 | | - | | 0.000 | 0.000 | 1.800 | - |
| Advanced Time and Frequency Tranfer Upgrade | C/FFP | Classified : Not Specified | 0.000 | 0.000 | | 0.000 | | 0.500 | Mar 2019 | - | | 0.500 | 0.600 | 1.100 | - |
| Optical Lattice Clocks | C/FFP | Classified : Not Specified | 0.000 | 0.000 | | 0.000 | | 0.305 | Mar 2019 | - | | 0.305 | 0.600 | 0.905 | - |
| | | **Subtotal** | 7.501 | 3.330 | | 3.941 | | 2.454 | | - | | 2.454 | 6.014 | 23.240 | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Development Support (All PTA - Labor) 1 | Allot | U.S. Naval Observatory (Civilian Labor) : Washington, DC | 0.347 | 0.103 | Dec 2016 | 0.138 | Dec 2017 | 0.173 | Dec 2018 | - | | 0.173 | Continuing | Continuing | Continuing |
| Development Support (All PTA - Labor) 2 | Allot | U.S. Naval Observatory (Civilian Labor) : Washington, DC | 0.347 | 0.103 | Mar 2017 | 0.138 | Mar 2018 | 0.173 | Mar 2019 | - | | 0.173 | Continuing | Continuing | Continuing |
| Development Support (All PTA - Labor) 3 | Allot | U.S. Naval Observatory (Civilian Labor) : Washington, DC | 0.347 | 0.103 | Jun 2017 | 0.138 | Jun 2018 | 0.173 | Jun 2019 | - | | 0.173 | Continuing | Continuing | Continuing |
| Development Support (All PTA - Labor) 4 | Allot | U.S. Naval Observatory (Civilian | 0.347 | 0.103 | Jul 2017 | 0.138 | Jul 2018 | 0.173 | Jul 2019 | - | | 0.173 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603207N / *Air/Ocean Tactical Applications* | Project (Number/Name)<br>2344 / *Precise Time and Astrometry* | |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Labor) : Washington, DC | | | | | | | | | | | | | |
| Software Development (EOP Automation) | C/FFP | U.S. Naval Observatory (Civilian Labor) : Washington, DC | 1.024 | 0.356 | Jun 2017 | 0.256 | Jun 2018 | 0.611 | Jun 2019 | - | | 0.611 | 0.000 | 2.247 | - |
| Travel 1 | Allot | U.S. Naval Observatory (Civilian Travel) : Varies | 0.022 | 0.010 | Dec 2016 | 0.005 | Oct 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.037 | - |
| Travel 2 | Allot | U.S. Naval Observatory (Civilian Travel) : Varies | 0.022 | 0.010 | Jan 2017 | 0.005 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.037 | - |
| Travel 3 | Allot | U.S. Naval Observatory (Civilian Travel) : Varies | 0.023 | 0.010 | Apr 2017 | 0.005 | Apr 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.038 | - |
| Travel 4 | Allot | U.S. Naval Observatory (Civilian Travel) : Varies | 0.023 | 0.010 | Jul 2017 | 0.005 | Jul 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.038 | - |
| VLBI2010 Testing and Integration | MIPR | NASA : GSFC | 0.444 | 0.461 | Jun 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.905 | - |
| Software Development (SW Correlator GUI) | C/FFP | U.S. Naval Observatory : Washington, DC | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | - |
| Astrometric Development | C/FFP | U.S. Naval Observatory : Washington, DC | 0.242 | 0.245 | Jul 2017 | 0.253 | Jul 2018 | 0.240 | Jul 2019 | - | | 0.240 | 0.000 | 0.980 | - |
| EOP Optimal Estimation | C/FFP | NASA : GSFC | 0.000 | 0.000 | | 0.000 | | 0.125 | Feb 2019 | - | | 0.125 | 0.500 | 0.625 | - |
| Foreign GNSS | C/FFP | Classified : Not Specified | 0.000 | 0.000 | | 0.000 | | 0.125 | Feb 2019 | - | | 0.125 | 0.500 | 0.625 | - |
| SLAC Software Upgrade | TBD | Not Specified : Not Specified | 0.000 | 0.000 | | 0.168 | Jan 2018 | 0.309 | Mar 2019 | - | | 0.309 | 0.690 | 1.167 | - |
| SIBR Placeholder | TBD | Not Specified : Not Specified | 0.000 | 0.000 | | 0.000 | | 0.000 | Jan 2019 | - | | 0.000 | 0.000 | 0.000 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2344 / *Precise Time and Astrometry* |

**Support ($ in Millions)**

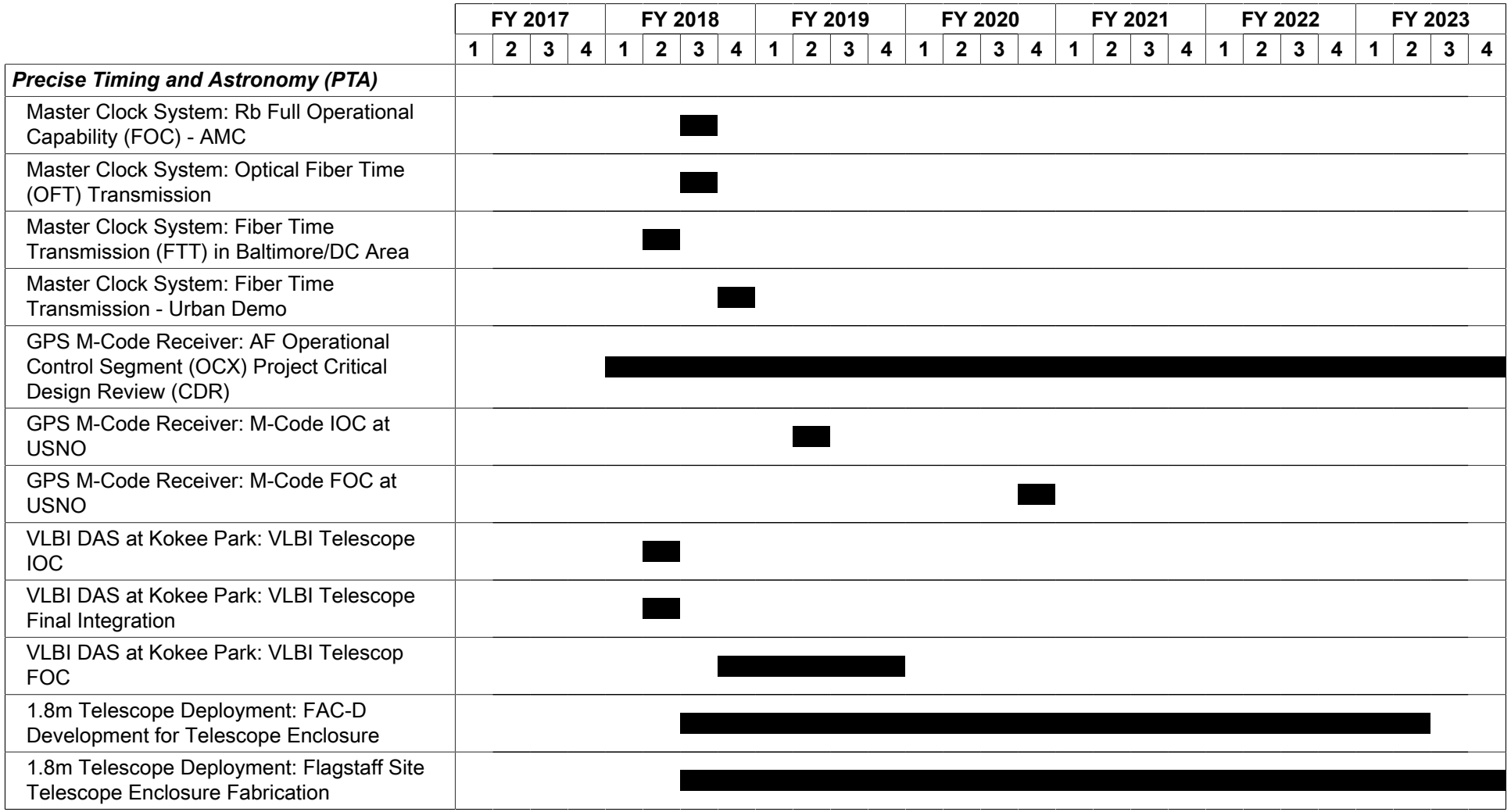
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Subtotal** | 3.188 | 1.514 | | 1.249 | | 2.102 | | - | | 2.102 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 10.689 | 4.844 | | 5.190 | | 4.556 | | - | | 4.556 | Continuing | Continuing | N/A |

**Remarks**

Decrease between FY18 and FY19 reduces research and development efforts to enhance the DoD Precise Time and Time Interval (PTTI) infrastructure within the Critical Time Dissemination (CTD) project. The specific impacts are classified; however, the risk to these important Time and Frequency (T&F) nodes across the DoD not receiving this technical refresh and upgrade will be severely increased by lack of programmed transitions from these RDTEN activities.

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2344 / *Precise Time and Astrometry* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2344 / *Precise Time and Astrometry* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Precise Timing and Astronomy (PTA)*** | | | | |
| Master Clock System: Rb Full Operational Capability (FOC) - AMC | 3 | 2018 | 3 | 2018 |
| Master Clock System: Optical Fiber Time (OFT) Transmission | 3 | 2018 | 3 | 2018 |
| Master Clock System: Fiber Time Transmission (FTT) in Baltimore/DC Area | 2 | 2018 | 2 | 2018 |
| Master Clock System: Fiber Time Transmission - Urban Demo | 4 | 2018 | 4 | 2018 |
| GPS M-Code Receiver: AF Operational Control Segment (OCX) Project Critical Design Review (CDR) | 1 | 2018 | 4 | 2023 |
| GPS M-Code Receiver: M-Code IOC at USNO | 2 | 2019 | 2 | 2019 |
| GPS M-Code Receiver: M-Code FOC at USNO | 4 | 2020 | 4 | 2020 |
| VLBI DAS at Kokee Park: VLBI Telescope IOC | 2 | 2018 | 2 | 2018 |
| VLBI DAS at Kokee Park: VLBI Telescope Final Integration | 2 | 2018 | 2 | 2018 |
| VLBI DAS at Kokee Park: VLBI Telescop FOC | 4 | 2018 | 4 | 2019 |
| 1.8m Telescope Deployment: FAC-D Development for Telescope Enclosure | 3 | 2018 | 2 | 2023 |
| 1.8m Telescope Deployment: Flagstaff Site Telescope Enclosure Fabrication | 3 | 2018 | 4 | 2023 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603207N / *Air/Ocean Tactical Applications* | Project (Number/Name)<br>2363 / *Remote Sensing Capability Development* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2363: *Remote Sensing Capability Development* | 7.355 | 3.773 | 3.959 | 0.324 | - | 0.324 | 0.327 | 0.328 | 0.328 | 0.000 | 0.000 | 16.394 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

$5.642M of FY19 funding was realigned from Program Element (PE) 0603207N Project Unit 2363 into PE 0604218N Air Ocean Equipment Engineering Project Unit 2363 Remote Sensing Capability Development as a result of a Budget Activity (BA) reclassification.

**A. Mission Description and Budget Item Justification**

Remote Sensing Capability Development characterizes the ocean environment using a variety of remote sensing techniques that provide that capability to discriminate atypical oceanographic phenomena from the natural environment that will greatly improve undersea dominance capabilities. The Naval Oceanographic Office will employ oceanographic data to refine and extend environmental characterization of the phenomena and disseminate data to the Fleet.

FY 2019 request provides for continued target data collection, enhancements on algorithms and continue to integrate algorithms for access over the network.

FY19 funds are to develop and deliver algorithms in support of the Remote Sensing Capability Development (RSCD) project and will support Fleet Anti-Submarine Warfare (ASW) and Mine Warfare (MIW) missions.
Remote Sensing Capability Development characterizes ocean environment using a variety of remote sensing techniques that provide that capability to discriminate atypical oceanographic phenomena from the natural environment that will greatly improve undersea dominance capabilities. The Naval Oceanographic Office will employ oceanographic data to refine and extend environmental characterization of the phenomena and disseminate data to the Fleet.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Remote Sensing Capability Development | 3.563 | 3.899 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Continue data collection in various weather and sea states to broaden the range of environmental conditions and reduce uncertainty in environmental prediction. Continue software algorithm performance analysis. Continue software algorithm enhancements to automatically detect oceanographic phenomena. Continue software algorithm enhancements and modifications to support transition to a new architecture. Continue to implement the algorithm performance assessment strategy as well as the test and evaluation plans. Document software algorithm test reports. Conduct algorithm Integration Decision. Continue to integrate algorithms for access over | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2363 / *Remote Sensing Capability Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| the network. Continue development of training to provide the user community education on using the different tools and applications. Coordinate Task, Collect, Process, Exploit, Disseminate (TCPED) process amongst inter-agencies to support Navy Missions.<br>***FY 2019 Base Plans:***<br>N/A<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>$5.642M of FY19 funding was realigned from Program Element (PE) 0603207N Project Unit 2363 into 0604218N Air Ocean Equipment Engineering Project 2363 Remote Sensing Capability Development as a result of a Budget Activity (BA) reclassification. | | | | | |
| ***Title:*** Remote Sensing Capability Dev.<br>***Articles:***<br>***Description:*** Collect remote sensing and ground truth data in various weather and sea states to broaden the range of environmental conditions and reduce uncertainty in environmental prediction. Develop and enhance software algorithms to automatically detect oceanographic phenomena. Integrate algorithms for access over the network. Enhance existing toolsets to provide users robust applications to assist in their daily tasks. Develop training to provide the user community education on using the different tools and applications. (Details held at a higher classification)<br>***FY 2018 Plans:***<br>Continue efforts to coordinate the TCPED process across DoD and civilian government agencies to support Navy Missions.<br>Supported transition of SEAHORSE algorithms to operations.<br>***FY 2019 Base Plans:***<br>Increase investment in new technology that allows for an accelerated pace to detect oceanographic phenomena of ocean science transitions in the interest of national security for Task Force Ocean.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:*** | 0.210<br>- | 0.060<br>- | 0.324<br>- | 0.000<br>- | 0.324<br>- |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2363 / *Remote Sensing Capability Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Funding increased from FY2018 (PE 0603207N) to FY2019 to expand scope of surface ship detection algorithms for SEAHORSE/Remote Sensing Capability Development based on emerging threats. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 3.773 | 3.959 | 0.324 | 0.000 | 0.324 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Remote Sensing Capability Development is being managed as a Program Executive Office (PEO) Project, via a Project Definition Document (PDD) construct for acquisition rigor and oversight.

Remote Sensing Capability Development is being managed as a PEO Project leveraging the Rapid Development and Deployment (RDD) construct for rigor and discipline.

**E. Performance Metrics**

Available in the Project's Requirements Definition Package (RDP).

Classified performance metrics are available in the Project's Requirements Definition Package (RDP) approved 14 July 2015

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2363 / *Remote Sensing Capability Development* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Remote Sensing Capability Development Data Collection | C/FFP | SAIC : Virginia | 1.284 | 0.497 | Feb 2017 | 0.521 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 2.302 | - |
| Remote Sensing Capability Development Data Collection | WR | NRL : Washington, DC | 1.212 | 0.730 | Nov 2016 | 0.944 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 2.886 | - |
| Remote Sensing Capability Development Data Collection | C/FFP | Raytheon : MA | 1.070 | 0.000 | Apr 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.070 | - |
| Remote Sensing Capability Development Data Collection | WR | NUWC : Keyport, WA | 0.232 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.232 | - |
| Remote Sensing Capability Development Data Collection | C/FFP | Cubic : San Diego, CA | 0.000 | 1.041 | Apr 2017 | 1.068 | Apr 2018 | 0.000 | | - | | 0.000 | 0.000 | 2.109 | - |
| REMOTE SENSING CAPABILITY DEVELOPMENT DATA COLLECTION | Various | VARIOUS : VARIOUS | 0.000 | 0.210 | Jan 2017 | 0.060 | Jan 2018 | 0.324 | Jan 2019 | - | | 0.324 | 5.176 | 5.770 | - |
| | | **Subtotal** | 3.798 | 2.478 | | 2.593 | | 0.324 | | - | | 0.324 | 5.176 | 14.369 | N/A |

**Remarks**

Due to a change in contract strategy funds were sent to Cubic vice Raytheon beginning in FY17.

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Remote Sensing Capability Development Data Collection | WR | SSC PAC : San Diego, CA | 0.472 | 0.495 | Feb 2017 | 0.536 | Mar 2018 | 0.000 | | - | | 0.000 | 0.000 | 1.503 | - |
| | | **Subtotal** | 0.472 | 0.495 | | 0.536 | | 0.000 | | - | | 0.000 | 0.000 | 1.503 | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603207N / *Air/Ocean Tactical Applications* | Project (Number/Name)<br>2363 / *Remote Sensing Capability Development* | |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Remote Sensing Capability Development Data Collection | WR | SSC PAC : San Diego, CA | 1.122 | 0.800 | Feb 2017 | 0.830 | Mar 2018 | 0.000 | | - | | 0.000 | 0.000 | 2.752 | - |
| Remote Sensing Capability Development Data Collection | WR | SSC Pacific : SAN DIEGO, CA | 1.081 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.375 | 1.456 | - |
| | | **Subtotal** | 2.203 | 0.800 | | 0.830 | | 0.000 | | - | | 0.000 | 0.375 | 4.208 | N/A |

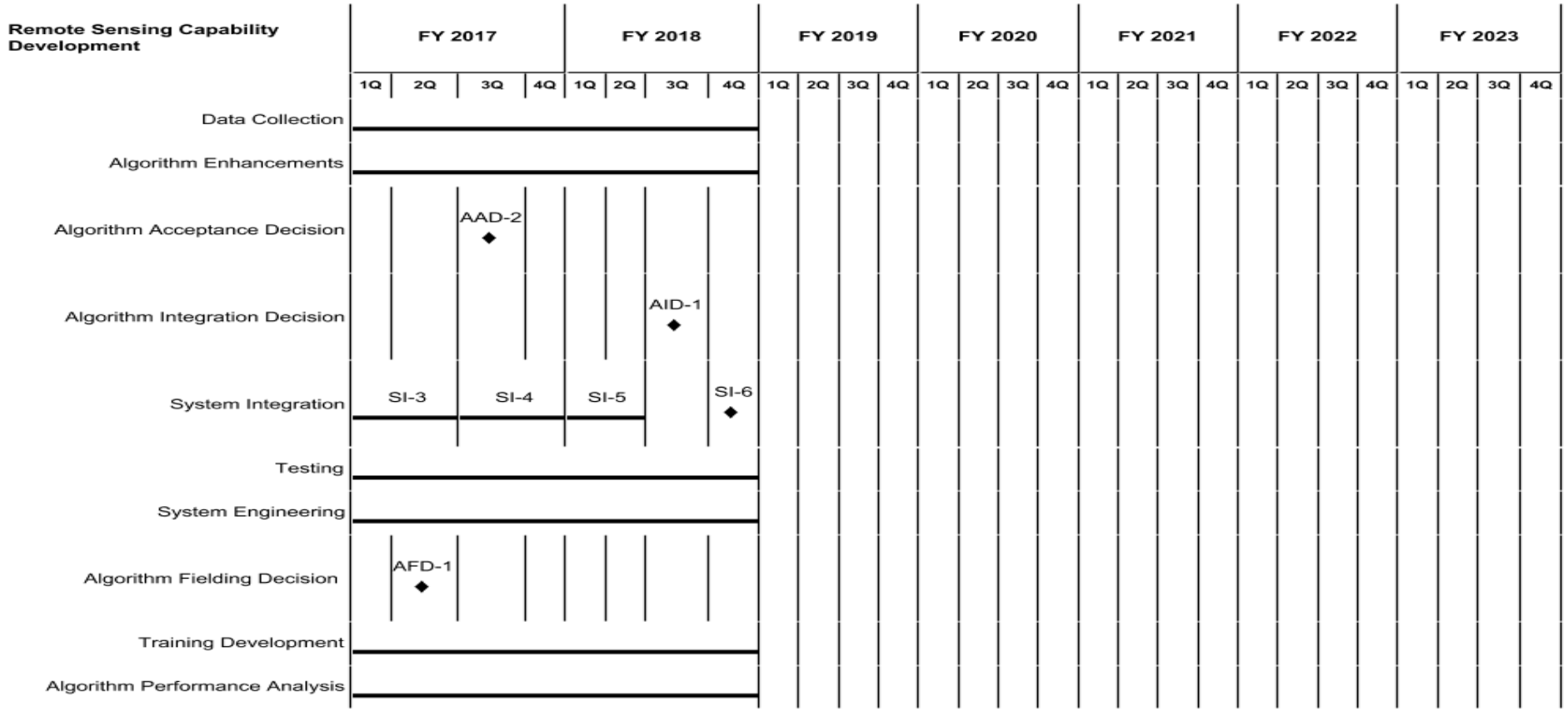
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Remote Sensing Capability Development Data Collection | C/FP | BAH : Virginia | 0.345 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.345 | - |
| Remote Sensing Capability Development Data Collection | C/FP | BAH : VA | 0.537 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.374 | 0.911 | - |
| | | **Subtotal** | 0.882 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.374 | 1.256 | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 7.355 | 3.773 | | 3.959 | | 0.324 | | - | | 0.324 | 5.925 | 21.336 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2363 / *Remote Sensing Capability Development* |




*2019PB - 0603207N - 2363.L39*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>2363 / *Remote Sensing Capability Development* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Remote Sensing Capability Development*** | | | | |
| Data Collection: | 1 | 2017 | 4 | 2018 |
| Algorithm Enhancements: | 1 | 2017 | 4 | 2018 |
| Algorithm Acceptance Decision: Algorithm Acceptance Decision 2 | 3 | 2017 | 3 | 2017 |
| Algorithm Integration Decision: Algorithm Integration Decision 1 | 3 | 2018 | 3 | 2018 |
| System Integration: System Integration 3 | 1 | 2017 | 2 | 2017 |
| System Integration: System Integration 4 | 3 | 2017 | 4 | 2017 |
| System Integration: System Integration 5 | 1 | 2018 | 2 | 2018 |
| System Integration: System Integration 6 | 4 | 2018 | 4 | 2018 |
| Testing: | 1 | 2017 | 4 | 2018 |
| System Engineering: | 1 | 2017 | 4 | 2018 |
| Algorithm Fielding Decision: Algorithm Fielding Decision 1 | 2 | 2017 | 2 | 2017 |
| Training Development: | 1 | 2017 | 4 | 2018 |
| Algorithm Performance Analysis: | 1 | 2017 | 4 | 2018 |
| ***Remote Sensing Capability Dev.*** | | | | |
| Data Collection:: Schedule Detail | 1 | 2017 | 2 | 2020 |
| Algorithm Development:: Schedule Detail | 1 | 2017 | 4 | 2017 |
| Application Development:: Schedule Detail | 1 | 2017 | 4 | 2018 |
| System Integration:: Schedule Detail | 3 | 2017 | 4 | 2019 |
| Testing:: Schedule Detail | 1 | 2017 | 4 | 2020 |
| System Engineering:: Schedule Detail | 1 | 2017 | 4 | 2020 |
| Training Development:: Schedule Detail | 1 | 2017 | 4 | 2018 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603207N / *Air/Ocean Tactical Applications* | Project (Number/Name)<br>3207 / *Fleet Synthetic Training* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3207: *Fleet Synthetic Training* | 1.466 | 0.933 | 0.253 | 0.266 | - | 0.266 | 0.283 | 0.305 | 0.326 | 0.332 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Fleet Synthetic Training (FST) provides Naval Forces with an enhanced in-port training capability. Integrating embedded shipboard training devices, aircraft and submarine simulators into an interoperable network with joint, coalition and interagency partners will provide more effective training for our deploying naval forces.

A key factor in achieving this new way of training our Naval Forces is to ensure that the required training is based on realistic characterizations of the physical environment. This project develops and delivers software that characterizes the ocean and atmospheric environments; adjusts to meet fleet-required training scenarios; allows synthetic training to be conducted in areas of planned and contingency operations; and, provides sufficient detail to simulate the real-world conditions of the physical environment in those areas of interest.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Fleet Synthetic Training | 0.933 | 0.253 | 0.266 | 0.000 | 0.266 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Ballistic Missile Defense (BMD) Fleet Synthetic Training (FST) at sea effort will provide the capability to conduct integrated Live, Virtual and Constructive (LVC) single or multi-ship exercises with ships at sea using the Navy Continuous Training Environment (NCTE). This capability will support BMD mission area Fleet training and mission rehearsal in theater, allow ships to participate in Combatant Command (COCOM) mandated BMD exercises while pier-side or underway, as well as enhance BMD training objective accomplishment in current Fleet Readiness Training Plan (FRTP) underway training events such as Composite Training Unit Exercises (COMPTUEX) and Joint Task Force Exercises (JTFEX). The NCTE and FST directly support Fleet training readiness, strike group and BMD platform deployment certifications. | | | | | |
| ***FY 2018 Plans:***<br>*Develop Machine-to-Machine (M2M) capability for Environmental Data Cube Support System (EDCSS) interface in support of environmental product generation.<br>*Research possible Fleet Synthetic Training (FST) integration into advanced Training (Integrated team trainers, warfighting development center support, etc.)<br>*Research/Implement live virtual constructive capability leveraging virtual testbed and Full Motion Video/Joint Semi-Automatic Forces/Next Generation Threat System research. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>3207 / *Fleet Synthetic Training* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| *Develop support for Electromagnetic Spectrum Maneuver Warfare (EMMW) leveraging Full Motion Video/Joint Semi-Automatic Forces/Next Generation Threat System research.<br>***FY 2019 Base Plans:***<br>*Research Fleet Synthetic Training (FST) integration into advanced Training (Integrated team trainers, warfighting development center support, etc.)<br>*Research/Implement live virtual constructive capability leveraging virtual testbed and Full Motion Video/Joint Semi-Automatic Forces/Next Generation Threat System research.<br>*Develop support for Electromagnetic Spectrum Maneuver Warfare (EMMW) leveraging Full Motion Video/Joint Semi-Automatic Forces/Next Generation Threat System research.<br>*Research/Develop use of FST for Basic/Integrated phase certification of Strike Group Oceanography Teams.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Increase FY18 and FY19 supports cost of advance technology to support Ballistic Missile Defense Fleet Synthetic Training to provide integrated live, virtual and constructive single or multi-ship exercises. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.933 | 0.253 | 0.266 | 0.000 | 0.266 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The included technology developments are primarily in-house with contractor participation through existing vehicles.

**E. Performance Metrics**

1) The Navy will produce meteorological and oceanographic environmental databases for all NCTE exercise areas. Will implement, test, and integrate with Joint Semi Automated Forces (JSAF) and other federates in accordance with requirements.

2) The Navy will complete data and architecture integration, including information assurance compliance for provision of synthetic meteorological and oceanographic data to the NCTE. Data and products will be available via NEP-Oc, DVD and/or Machine-to-Machine (M2M) during planning and execution of FST events.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>3207 / *Fleet Synthetic Training* |

3) The Navy will produce products based on synthetic ocean environment and synthetic satellite/radar imagery based on meteorological environmental data for all NCTE exercise areas. Products are utilized in planning and execution of FST events.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603207N / *Air/Ocean Tactical Applications* | Project (Number/Name)<br>3207 / *Fleet Synthetic Training* | |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Development Support | WR | AER : VA | 0.258 | 0.300 | Jan 2017 | 0.083 | Jan 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Software Development | WR | Not Specified : Not Specified | 0.070 | 0.142 | Jan 2017 | 0.041 | Jan 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Configuration Management | WR | AER : VA | 0.269 | 0.100 | Jan 2017 | 0.039 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.408 | - |
| Studies and Analysis | Various | AER : VA | 0.369 | 0.100 | Apr 2017 | 0.039 | Apr 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.508 | - |
| Award Fees | WR | NAWC TSD (Orlando, FL) : Not Specified | 0.057 | 0.036 | Jan 2017 | 0.012 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.105 | - |
| Technical Data | WR | Not Specified : Not Specified | 0.119 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.119 | - |
| | | **Subtotal** | 1.142 | 0.678 | | 0.214 | | 0.000 | | - | | 0.000 | Continuing | Continuing | N/A |

**Test and Evaluation ($ in Millions)**

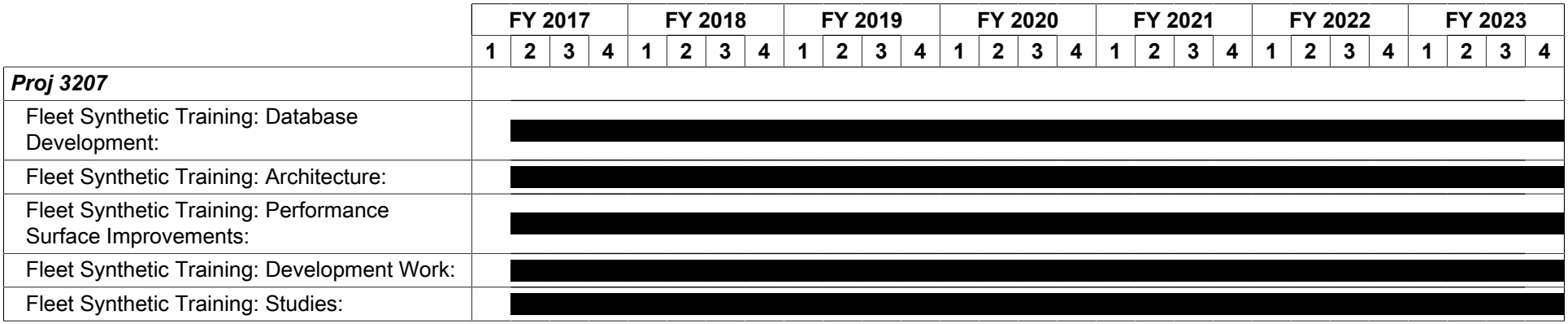
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Operational Test & Evaluation | WR | AER : VA | 0.171 | 0.150 | Jan 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.321 | - |
| Development Test and Evaluation | WR | AER : VA | 0.153 | 0.105 | Jan 2017 | 0.039 | Jan 2018 | 0.266 | Jan 2019 | - | | 0.266 | 0.000 | 0.563 | - |
| | | **Subtotal** | 0.324 | 0.255 | | 0.039 | | 0.266 | | - | | 0.266 | 0.000 | 0.884 | N/A |

| | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 1.466 | 0.933 | | 0.253 | | 0.266 | | - | | 0.266 | Continuing | Continuing | N/A |

**Remarks**

Increase FY18 and FY19 supports cost of advance technology to support Ballistic Missile Defense Fleet Synthetic Training to provide integrated live, virtual and constructive single or multi-ship exercises.

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>3207 / *Fleet Synthetic Training* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>3207 / *Fleet Synthetic Training* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3207*** | | | | |
| Fleet Synthetic Training: Database Development: | 2 | 2017 | 4 | 2023 |
| Fleet Synthetic Training: Architecture: | 2 | 2017 | 4 | 2023 |
| Fleet Synthetic Training: Performance Surface Improvements: | 2 | 2017 | 4 | 2023 |
| Fleet Synthetic Training: Development Work: | 2 | 2017 | 4 | 2023 |
| Fleet Synthetic Training: Studies: | 2 | 2017 | 4 | 2023 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603207N / *Air/Ocean Tactical Applications* | Project (Number/Name)<br>3404 / *Tactical Environmental Support* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3404: *Tactical Environmental Support* | 0.000 | 0.000 | 0.327 | 2.595 | - | 2.595 | 2.616 | 2.643 | 2.671 | 2.685 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The Tactical Environmental Support Project (3404) enables the future warfighter to leverage environmental data gathered, assimilated and predicted under Projects 2341 (METOC Collections) and 2342 (METOC processing) by incorporating them into warfighting technological, net-centric applications that shape the way in which commanders engage the enemy, take full advantage of environmental conditions (and their impacts on systems and sensors) and complete the mission in the most efficient manner feasible. These software decision support tools complement the capabilities found in the NITES-Next Program of Record, and provide platform, sensor, communications, and weapon systems performance assessments for littoral and deep-strike warfighters. The following warfighting disciplines benefit directly from these METOC Exploitation capabilities: (1) Undersea Warfare (USW), Anti-Submarine Warfare (ASW), Mine Warfare (MIW), Amphibious Warfare (AMW), Anti-Surface Warfare (ASUW), Anti-Air Warfare, (AAW), Strike Warfare (STW), Expeditionary Warfare (EXW), Electronic Warfare (EW), Information Operations (IO), Intelligence Operations (INT), Non-Combat Operations (NCO), Command, Control, Communication (CCC), and Naval Special Warfare (NSW).

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Tactical Environmental Support | 0.000 | 0.327 | 2.595 | 0.000 | 2.595 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** The Tactical Environmental Support Project (3404) enables the future warfighter to leverage environmental data gathered, assimilated and predicted under Projects 2341 (METOC Collections) and 2342 (METOC processing) by incorporating them into warfighting technological, net-centric applications that shape the way in which commanders engage the enemy, take full advantage of environmental conditions (and their impacts on systems and sensors) and complete the mission in the most efficient manner feasible. These software decision support tools complement the capabilities found in the NITES-Next POR, and provide platform, sensor, communications, and weapon systems performance assessments for littoral and deep-strike warfighters. The following warfighting disciplines benefit directly from these METOC Exploitation capabilities: (1) Undersea Warfare (USW), Anti-Submarine Warfare (ASW), Mine Warfare (MIW), Amphibious Warfare (AMW), Anti-Surface Warfare (ASUW), Anti-Air Warfare, (AAW), Strike Warfare (STW), Expeditionary Warfare (EXW), Electronic Warfare (EW), Information Operations (IO), Intelligence Operations (INT), Non-Combat Operations (NCO), Command, Control, Communication (CCC), and Naval Special Warfare (NSW).<br><br>Accomplishments and plans described below are examples for each effort category. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>3404 / *Tactical Environmental Support* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***FY 2018 Plans:***<br>- Continue: Provide a new ashore (reach back) radar/radio frequency (RF) and electro-optical (EO) performance products system that is modular, extensible, and high fidelity environmental model-driven that can serve as a replacement for the current tactical decision aids (TDAs) for RF: AREPS (Advanced Refractive Effects Prediction System), and EO: TAWS (Target Acquisition Weapons Software).<br>- Continue: Enhance TrueView/Builder to maximize impact on and relevance to Navy and Marine Corps operations; make it fully compatible with Navy and Marine Corps operational computer systems and networks.<br>- Continue: Leverage The Scalable Tactical Acoustic Propagation Loss Engine (STAPLE) Transitions project to support on-going transition of OAML model and database improvements into STAPLE in order to provide a common core element to a large number of Fleet ASW tactical and high fidelity training systems.<br>- Continue: Improve Parabolic Equation (PE) modeling of passive sonar performance modeling within the TOPSIDE mission planner for regional ASW modeling; improve the physics and utility of the RAM/Seahawk model to extend to higher frequencies.<br>- Continue: Evaluate and develop algorithms that leverage optical remote sensing data from Sentinel-3A, JPSS-1 VIIRS, Sentinel-3B and work toward transition of algorithms.<br>- Continue: Improve the Naval Research Laboratory Atmospheric Acoustic Propagation (NRLAAP) system by developing new multi-vehicle simulation capabilities, incorporating the effects of propagation and ambient noise uncertainty/variability into probability of detection calculations, and improving the efficiency of the model calculations by incorporating advances from the NRL base program "Atmospheric environmental acoustic features for reduction of performance prediction time".<br>- Continue: Work toward EPMA improvements, including: (1) New services to modernize MIW databases for imagery; (2) Refresh of environmental workflows for Bathymetry, Salinity, Temperature, Optics, and Currents; (3) Integration with new Mine Contact Database; (4) Define requirements for integration with Net-Centric Sensor Analysis for Mine Warfare (NSAM), NAVSEA Surface Mine Warfare Program (PMS-495), Naval Surface Warfare Center - Panama City Division (NSWC-PCD); (5) Demonstrate interoperability with latest NSAM service architecture.<br>- Continue: Provide automated mission-relevant water sampling plans with joint optimization of varied observing systems: gliders, profiling floats, shipboard, satellite, buoy, air-deployed, etc.<br>- Continue: Improvement and validation of the Navy Surface Layer Atmospheric Model (NAVSLaM), based on evaluation of recent applied research results and the availability of experimental datasets and produce a sample near-surface Cn2 (turbulence) climatology database for evaluation purposes. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>3404 / *Tactical Environmental Support* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Begin: Improve Builder software to include Bragg Line analysis, upgrades to the Ionospheric model and upgrades to output metadata. | | | | | |
| ***FY 2019 Base Plans:***<br>- Complete: Provide a new ashore (reach back) radar/radio frequency (RF) and electro-optical (EO) performance products system that is modular, extensible, and high fidelity environmental model-driven that can serve as a replacement for the current tactical decision aids (TDAs) for RF: AREPS (Advanced Refractive Effects Prediction System), and EO: TAWS (Target Acquisition Weapons Software).<br>- Continue: Improve Builder software to include Bragg Line analysis, upgrades to the Ionospheric model and upgrades to output metadata.<br>- Complete: Enhance TrueView/Builder to maximize impact on and relevance to Navy and Marine Corps operations; make it fully compatible with Navy and Marine Corps operational computer systems and networks.<br>- Complete: Leverage The Scalable Tactical Acoustic Propagation Loss Engine (STAPLE) Transitions project to support on-going transition of OAML model and database improvements into STAPLE in order to provide a common core element to a large number of Fleet ASW tactical and high fidelity training systems.<br>- Complete: Improve Parabolic Equation (PE) modeling of passive sonar performance modeling within the TOPSIDE mission planner for regional ASW modeling; improve the physics and utility of the RAM/Seahawk model to extend to higher frequencies.<br>- Complete: Evaluate and develop algorithms that leverage optical remote sensing data from Sentinel-3A, JPSS-1 VIIRS, Sentinel-3B and work toward transition of algorithms.<br>- Complete: Improve the Naval Research Laboratory Atmospheric Acoustic Propagation (NRLAAP) system by developing new multi-vehicle simulation capabilities, incorporating the effects of propagation and ambient noise uncertainty/variability into probability of detection calculations, and improving the efficiency of the model calculations by incorporating advances from the NRL base program "Atmospheric environmental acoustic features for reduction of performance prediction time".<br>- Complete: Work toward EPMA improvements, including: (1) New services to modernize MIW databases for imagery; (2) Refresh of environmental workflows for Bathymetry, Salinity, Temperature, Optics, and Currents; (3) Integration with new Mine Contact Database; (4) Define requirements for integration with Net-Centric Sensor Analysis for Mine Warfare (NSAM), PMS-495, NSWC-PCD; (5) Demonstrate interoperability with latest NSAM service architecture.<br>- Complete: Provide automated mission-relevant water sampling plans with joint optimization of varied observing systems: gliders, profiling floats, shipboard, satellite, buoy, air-deployed, etc. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>3404 / *Tactical Environmental Support* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Complete: Improvement and validation of the Navy Surface Layer Atmospheric Model (NAVSLaM), based on evaluation of recent applied research results and the availability of experimental datasets and produce a sample near-surface Cn2 (turbulence) climatology database for evaluation purposes.<br>- Initiate: Leverage lessons learned from NAVSLaM to create a holistic approach to atmospheric boundary larger turbulence observation, data-basing and modeling, as they pertains to Navy tactical problems.<br>- Initiate: Enhancements to newly fielded RF and EO capability that incorporates Fleet user feedback and tactical lessons learned.<br>- Initiate: Explore synergies with other DoD ocean observation system initiatives in order to rapidly advance and scale-up Navy ocean observation systems, data exfiltration, data assimilation and forward modeling capabilities.<br>- Initiate: Fully explore artificial intelligence (AI) and machine learning aspects of EPMA, to include optimization within private cloud and "big data analytics" architectures. Incorporate "mirrored" test and evaluation computational environments when fielding new EPMA capabilities.<br>- Initiate: Develop technologies that will improve NAVAIR's ability to quickly integrate newly developed NRLAAP capabilities.<br>- Initiate: Explore options in terms of long-term, state-of-the-art maintenance of and improvements to PE and ASW modeling.<br>- Initiate: Explore means of integrating STAPLE with newly developed cloud-based OAML software distribution capability.<br>- Initiate: Make additional modifications to TrueView/Builder in order to meet new Fleet operational and Cyber requirements in an agile manner.<br>- Initiate: Leverage lessons learned from remote sensing data algorithms for use in SmallSats and other newly emerging remote sensing technologies.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Funding Increases from FY2018 to FY2019 is due to realignment of resources within PE 0603207N Project Unit/LI 2341 METOC Data Acquisition for follow-on efforts that will more fully transition tactical environmental technologies into Fleet operations, as well as address operational lessons learned from fielding of recently introduced technologies. This feedback mechanism enables agility, thus accelerating the improvement of capabilities that provide a distinct tactical advantage to the Fleet and Marine Corps. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 0.327 | 2.595 | 0.000 | 2.595 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>3404 / *Tactical Environmental Support* |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Acquisition, management and contracting strategies are to support the Tactical Environmental Support Project to develop, demonstrate and validate products and decision aids to understand and predict the impact of the environment on military operations.

**E. Performance Metrics**

Goal: Develop techniques and tools to transform traditional METOC predicted variables into more directly tactially relevant variables, and allow METOC personnel and others to understand the impact of the environment on sensors, communications, and weapons. Focus areas include, but are not limited to, electromagnetic maneuver warfare, electro-optical impacts (of environment on sensors and weapons systems), and anstisubmarine warfare. Metric -- Tasks will address no less than 75% of applicable capability gaps and requirements.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>3404 / *Tactical Environmental Support* |

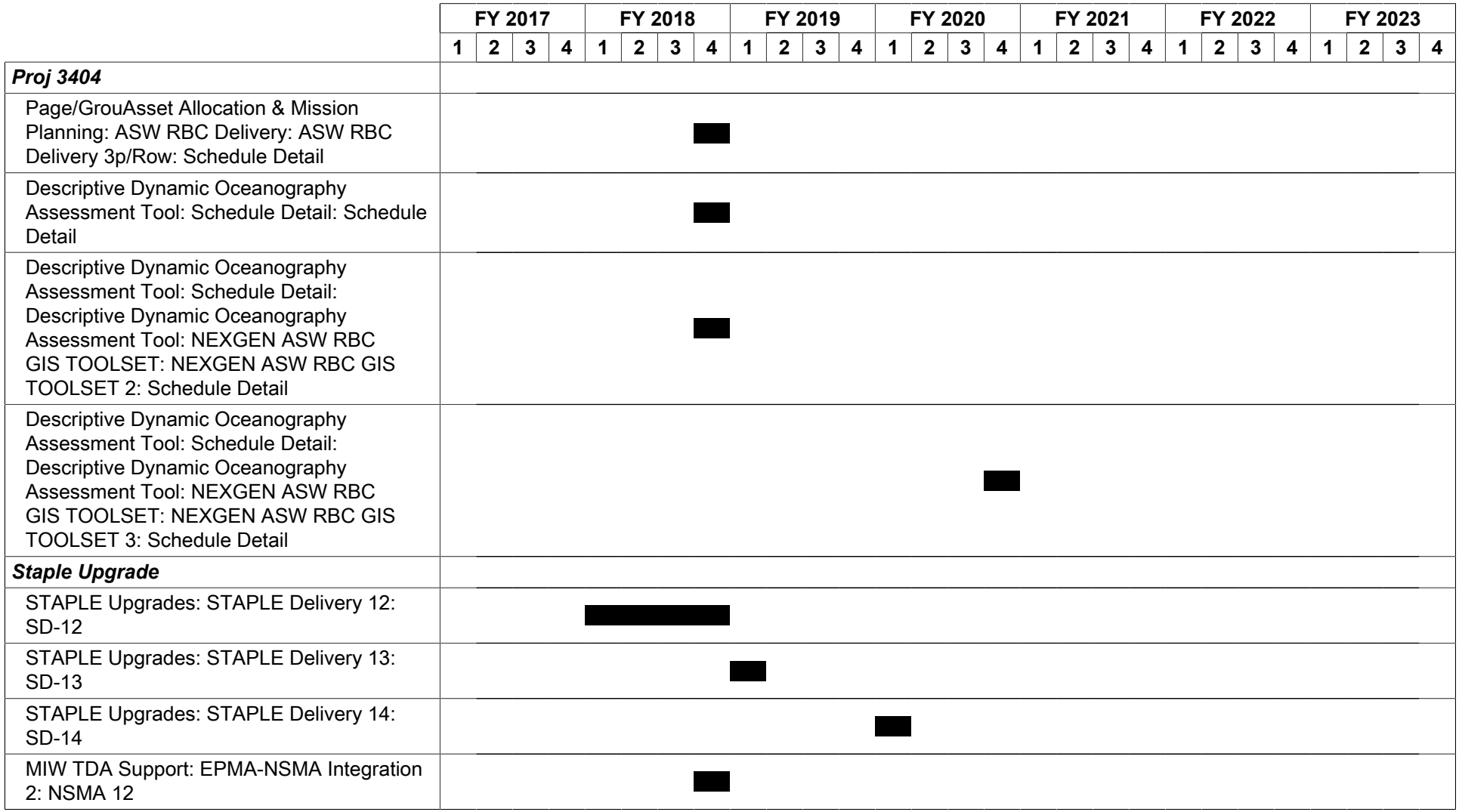
**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METOC Tactical Environmental Support | WR | NRL : Washington, DC | 0.000 | 0.000 | | 0.145 | Nov 2017 | 2.283 | Nov 2018 | - | | 2.283 | 0.000 | 2.428 | - |
| METOC Tactical Environmental Support | WR | NRL : Monterey, CD Stennis Space Center,MS | 0.000 | 0.000 | | 0.182 | Nov 2017 | 0.312 | Nov 2018 | - | | 0.312 | Continuing | Continuing | Continuing |
| METOC Tactical Environmental Support-Staple Transitions | WR | NSWC Carderock : West Bethesda, MD | 0.000 | 0.000 | | 0.000 | Nov 2017 | 0.000 | | - | | 0.000 | 2.500 | 2.500 | - |
| METOC Tactical Environmental Support | C/FFP | Various : Various | 0.000 | 0.000 | | 0.000 | Nov 2017 | 0.000 | | - | | 0.000 | 0.075 | 0.075 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.327 | | 2.595 | | - | | 2.595 | Continuing | Continuing | N/A |

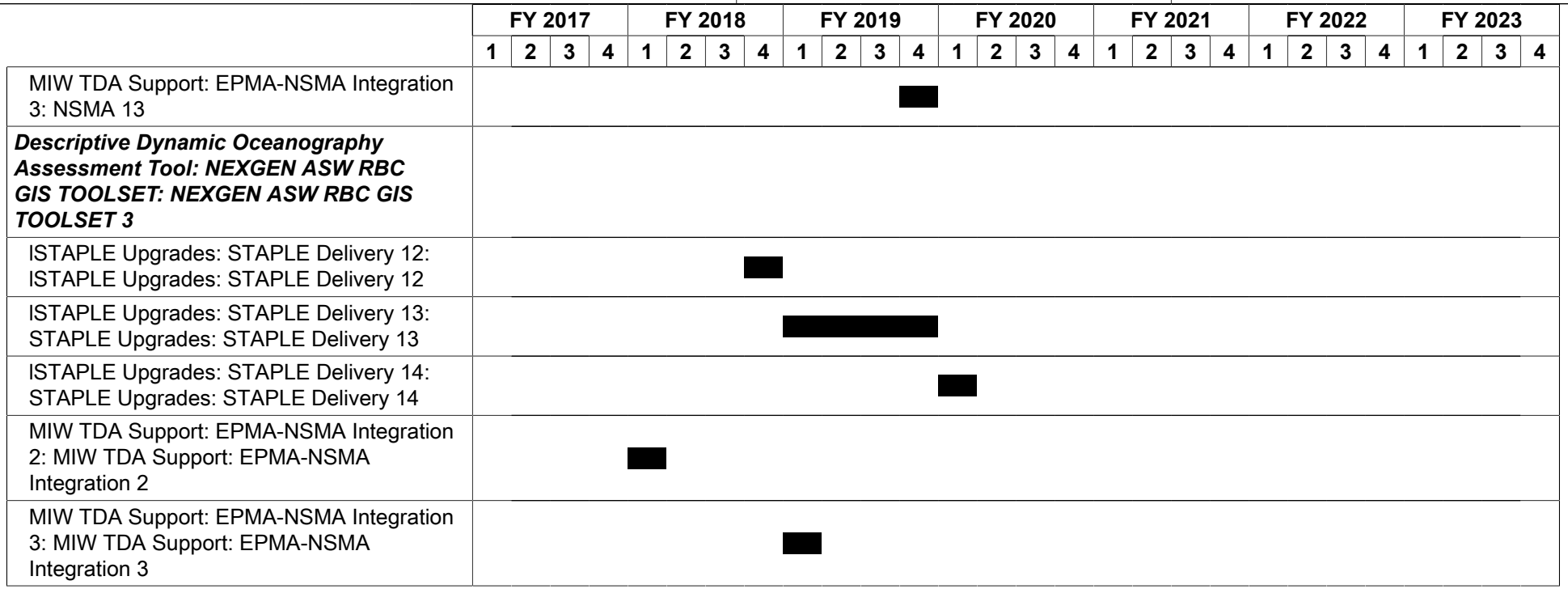
| | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 0.327 | | 2.595 | | - | | 2.595 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>3404 / *Tactical Environmental Support* |



| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>3404 / *Tactical Environmental Support* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>3404 / *Tactical Environmental Support* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3404*** | | | | |
| Page/GrouAsset Allocation & Mission Planning: ASW RBC Delivery: ASW RBC Delivery 3p/Row: Schedule Detail | 4 | 2018 | 4 | 2018 |
| Descriptive Dynamic Oceanography Assessment Tool: Schedule Detail: Schedule Detail | 4 | 2018 | 4 | 2018 |
| Descriptive Dynamic Oceanography Assessment Tool: Schedule Detail: Descriptive Dynamic Oceanography Assessment Tool: NEXGEN ASW RBC GIS TOOLSET: NEXGEN ASW RBC GIS TOOLSET 2: Schedule Detail | 4 | 2018 | 4 | 2018 |
| Descriptive Dynamic Oceanography Assessment Tool: Schedule Detail: Descriptive Dynamic Oceanography Assessment Tool: NEXGEN ASW RBC GIS TOOLSET: NEXGEN ASW RBC GIS TOOLSET 3: Schedule Detail | 4 | 2020 | 4 | 2020 |
| ***Staple Upgrade*** | | | | |
| STAPLE Upgrades: STAPLE Delivery 12: SD-12 | 1 | 2018 | 4 | 2018 |
| STAPLE Upgrades: STAPLE Delivery 13: SD-13 | 1 | 2019 | 1 | 2019 |
| STAPLE Upgrades: STAPLE Delivery 14: SD-14 | 1 | 2020 | 1 | 2020 |
| MIW TDA Support: EPMA-NSMA Integration 2: NSMA 12 | 4 | 2018 | 4 | 2018 |
| MIW TDA Support: EPMA-NSMA Integration 3: NSMA 13 | 4 | 2019 | 4 | 2019 |
| ***Descriptive Dynamic Oceanography Assessment Tool: NEXGEN ASW RBC GIS TOOLSET: NEXGEN ASW RBC GIS TOOLSET 3*** | | | | |
| ISTAPLE Upgrades: STAPLE Delivery 12: ISTAPLE Upgrades: STAPLE Delivery 12 | 4 | 2018 | 4 | 2018 |
| ISTAPLE Upgrades: STAPLE Delivery 13: STAPLE Upgrades: STAPLE Delivery 13 | 1 | 2019 | 4 | 2019 |
| ISTAPLE Upgrades: STAPLE Delivery 14: STAPLE Upgrades: STAPLE Delivery 14 | 1 | 2020 | 1 | 2020 |
| MIW TDA Support: EPMA-NSMA Integration 2: MIW TDA Support: EPMA-NSMA Integration 2 | 1 | 2018 | 1 | 2018 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>3404 / *Tactical Environmental Support* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| MIW TDA Support: EPMA-NSMA Integration 3: MIW TDA Support: EPMA-NSMA Integration 3 | 1 | 2019 | 1 | 2019 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603207N / *Air/Ocean Tactical Applications* | Project (Number/Name)<br>3405 / *Decision Support Products & Dissemination* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3405: *Decision Support Products & Dissemination* | 0.000 | 0.000 | 0.327 | 1.094 | - | 1.094 | 1.115 | 1.144 | 1.171 | 1.186 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Decision Support Products & Dissemination efforts enable the future warfighter to leverage environmental data gathered, assimilated, predicted and exploited by optimizing data formatting, compression, packaging, depiction, data-basing and transfer methodologies that permit the rapid dissemination of actionable battlespace environmental (METOC) information over tactical and reach-back networks. This project ensures warfighters, commanders and those who support them are fully synchronized in terms of environmental data products shared among a multitude of platforms, systems and common operating pictures (COPs). METOC information is highly dynamic. Just as time synchronization is essential to navigation principles, timely METOC knowledge and information are vital to battlespace environmental exploitation, placing the warfighter and support elements in spatial and temporal synchronization, and at a collective advantage, in terms of the current and predicted states of the ocean and atmosphere.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Decision Support Products & Dissemination | 0.000 | 0.327 | 1.094 | 0.000 | 1.094 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** The Decision Support Products and Dissemination Project (3405) enables the future warfighter to leverage environmental data gathered, assimilated, predicted and exploited under Projects 2341 (METOC Collections), 2342 (METOC processing) and 3404 (METOC exploitation) by optimizing data formatting, compression, packaging, depiction, data-basing and transfer methodologies that permit the rapid dissemination of actionable battlespace environmental (METOC) information over tactical and reach-back networks. This project ensures warfighters, commanders and those who support them are fully synchronized in terms of environmental data products shared among a multitude of platforms, systems and common operating pictures (COPs). METOC information is highly dynamic. Just as time synchronization is essential to navigation principles, timely METOC knowledge and information synchronization is vital to battlespace environmental exploitation, placing the warfighter and all of those who support him on the "same sheet of music" and at a collective advantage, in terms of the current and predicted states of the ocean and atmosphere.<br><br>Accomplishments and plans described below are examples for each effort category.<br><br>***FY 2018 Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>3405 / *Decision Support Products & Dissemination* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Continue: Mature the A3PET capabilities already demonstrated in the prototype; provide an intuitive, interactive user interface, and provide a service application programming interface (API) for potential programmatic use by backend components in the future.<br>- Continue: Provide acoustically consistent oceanographic confidence estimates based on current continuous ocean model/data comparisons for the Navy's operational ocean and acoustics communities.<br>- Initiate: Evaluate global ocean analyses and forecasts from different national/international centers, with respect to both hydrographic and acoustic properties.<br>- Initiate: Develop ship routing and base preparedness algorithms so that they can be employed on the following systems: the Automated Tropical Cyclone Forecast System (ATCF), the Joint METOC Viewer (JMV), and the Advanced Weather Interactive Processing System Version II (AWIPS II).<br>***FY 2019 Base Plans:***<br>- Continue: Evaluate global ocean analyses and forecasts from different national/international centers, with respect to both hydrographic and acoustic properties.<br>- Continue: Develop ship routing and base preparedness algorithms so that they can be employed on the following systems: the Automated Tropical Cyclone Forecast System (ATCF), the Joint METOC Viewer (JMV), and the Advanced Weather Interactive Processing System Version II (AWIPS II).<br>- Complete: Provide acoustically consistent oceanographic confidence estimates based on current continuous ocean model/data comparisons for the Navy's operational ocean and acoustics communities.<br>- Complete: Mature the Advanced Air ASW Planning abs Evaluation Tool (A3PET) capabilities already demonstrated in the prototype; provide an intuitive, interactive user interface, and provide a service application programming interface (API) for potential programmatic use by backend components in the future.<br>- Initiate: Explore the use of oceanographic confidence estimates derived from model/data comparisons to improve Navy ocean and acoustic models and tactical decision aids.<br>- Initiate: Leverage lessons learned from ocean analysis and forecast evaluations in order to improve databases, data assimilation techniques and ocean and acoustic models in a more synergistic way.<br>- Initiate: Leverage lessons learned from A3PET to create a holistic approach to real-time ASW mission planning and re-tasking by exploring machine learning, high-performance computing, cloud computing and "big data analytics" aspects of the ASW mission planning and associated ocean environment problem.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>3405 / *Decision Support Products & Dissemination* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Funding Increases from FY2018 to FY2019 due to realignment of resources from Project Unit (PU)/LI 2342 METOC Data Acquisition which will result in follow-on efforts that more fully address the needs of Fleet and Marine Corps decision makers, to include technologies that fully integrate state-of-the-art and tactically-relevant atmospheric and ocean modeling capabilities as well as state-of-the-art information technologies such as cloud-based and high-performance computing, as well as "big data analytics" and machine learning. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 0.327 | 1.094 | 0.000 | 1.094 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Acquisition, management and contracting strategies are to support the Decision Support Products & Dissemination Project to develop, demonstrate and validate products and decision aids to provide environmentally based recommendations to commanders at the Strategic, Operational, and Tactical levels of military operations.

**E. Performance Metrics**

Goal: Develop techniques and tools to provide tactially relevant METOC based advice to military commanders. Focus areas include, but are not limited to, electromagnetic maneuver warfare, electro-optical impacts (of environment on sensors and weapons systems), and anstisubmarine warfare. Metric -- Tasks will address no less than 75% of applicable capability gaps and requirements.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603207N / *Air/Ocean Tactical Applications* | Project (Number/Name)<br>3405 / *Decision Support Products & Dissemination* | |

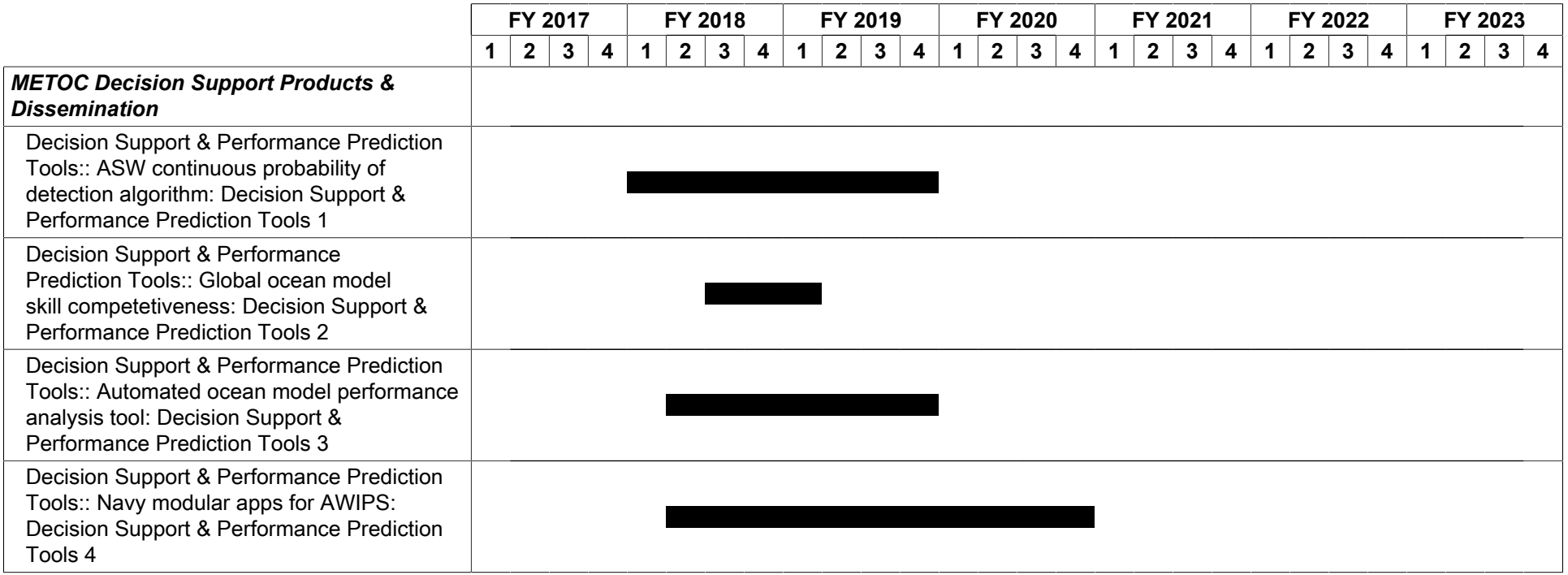
**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METOC Tactical Environmental Support | WR | NRL : Washington DC | 0.000 | 0.000 | | 0.111 | Nov 2017 | 0.232 | Nov 2018 | - | | 0.232 | 0.000 | 0.343 | - |
| METOC Tactical Environmental Support | WR | NRL : Monterey, CA; Dtennis Space Center, MS | 0.000 | 0.000 | | 0.100 | Nov 2017 | 0.100 | Nov 2018 | - | | 0.100 | Continuing | Continuing | Continuing |
| METOC Tactical Environmental Support | C/FFP | Various : Various | 0.000 | 0.000 | | 0.116 | Nov 2017 | 0.762 | Nov 2018 | - | | 0.762 | 0.000 | 0.878 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.327 | | 1.094 | | - | | 1.094 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 0.327 | | 1.094 | | - | | 1.094 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>3405 / *Decision Support Products & Dissemination* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603207N / *Air/Ocean Tactical Applications* | **Project (Number/Name)**<br>3405 / *Decision Support Products & Dissemination* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***METOC Decision Support Products & Dissemination*** | | | | |
| Decision Support & Performance Prediction Tools:: ASW continuous probability of detection algorithm: Decision Support & Performance Prediction Tools 1 | 1 | 2018 | 4 | 2019 |
| Decision Support & Performance Prediction Tools:: Global ocean model skill competetiveness: Decision Support & Performance Prediction Tools 2 | 3 | 2018 | 1 | 2019 |
| Decision Support & Performance Prediction Tools:: Automated ocean model performance analysis tool: Decision Support & Performance Prediction Tools 3 | 2 | 2018 | 4 | 2019 |
| Decision Support & Performance Prediction Tools:: Navy modular apps for AWIPS: Decision Support & Performance Prediction Tools 4 | 2 | 2018 | 4 | 2020 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603216N *I Aviation Survivability* |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Program Element | 183.223 | 14.811 | 5.566 | 7.050 | - | 7.050 | 7.271 | 7.408 | 7.502 | 7.486 | Continuing | Continuing |
| 0584: *Acft Protective Clothing* | 99.335 | 2.386 | 2.534 | 3.918 | - | 3.918 | 4.116 | 4.188 | 4.221 | 4.135 | Continuing | Continuing |
| 0591: *Acft Survivability, Vulnerability & Safety* | 45.261 | 1.343 | 1.385 | 1.502 | - | 1.502 | 1.512 | 1.543 | 1.572 | 1.605 | Continuing | Continuing |
| 0592: *Acft & Ordnance Safety* | 35.477 | 0.907 | 1.060 | 1.047 | - | 1.047 | 1.045 | 1.068 | 1.089 | 1.112 | Continuing | Continuing |
| 1819: *CV Acft Fire Suppress System* | 3.133 | 0.504 | 0.587 | 0.583 | - | 0.583 | 0.598 | 0.609 | 0.620 | 0.634 | Continuing | Continuing |
| 9999: *Congressional Adds* | 0.017 | 9.671 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 9.688 |

**A. Mission Description and Budget Item Justification**

Aviation Survivability addresses the issues of aircrew and platform survivability, focusing on enhancing overall opportunity for aircrew and platform protection and enhanced performance. The capabilities addressed under this program element counter emerging threats of next generation operational weapons systems and enhance combat effectiveness in future operational mission scenarios.

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under ADVANCED COMPONENT DEVELOPMENT AND PROTOTYPES because it includes all efforts necessary to evaluate integrated technologies, representative models or prototype systems in a high fidelity and realistic operating environment.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 5.239 | 5.566 | 5.792 | - | 5.792 |
| Current President's Budget | 14.811 | 5.566 | 7.050 | - | 7.050 |
| Total Adjustments | 9.572 | 0.000 | 1.258 | - | 1.258 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | -0.007 | 0.000 | | | |
| • SBIR/STTR Transfer | -0.420 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | 1.357 | - | 1.357 |
| • Rate/Misc Adjustments | -0.001 | 0.000 | -0.099 | - | -0.099 |
| • Congressional Add Adjustments | 10.000 | - | - | - | - |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603216N *I Aviation Survivability* |

| Congressional Add Details ($ in Millions, and Includes General Reductions) | FY 2017 | FY 2018 |
|---|---|---|
| **Project:** 9999: *Congressional Adds* | | |
| Congressional Add: *Program Increase* | 9.671 | 0.000 |
| Congressional Add Subtotals for Project: 9999 | 9.671 | 0.000 |
| Congressional Add Totals for all Projects | 9.671 | 0.000 |

**Change Summary Explanation**

Technical: Not applicable

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603216N / *Aviation Survivability* | Project (Number/Name)<br>0584 / *Acft Protective Clothing* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0584: *Acft Protective Clothing* | 99.335 | 2.386 | 2.534 | 3.918 | - | 3.918 | 4.116 | 4.188 | 4.221 | 4.135 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Project 0584 develops, demonstrates, and validates technologies designed to enhance warfighter performance, protection, mission effectiveness, and survivability. The project addresses life support equipment, advanced helmet vision systems, escape systems technology, crew centered cockpit design, and control stations. Integrate and use alternative and new technologies for the Pilot Vehicle Integration, optimization of Intelligence Surveillance and Reconnaissance (ISR), and Forward Air Control-Air mission areas. Demonstrate innovative tools / approaches to improve situational awareness, new ISR technologies, and Graphical User Interfaces (new symbology and optimized logic for system employment). It responds to a number of operational requirements documents, including OR# 210-05-88 for Chemical and Biological protection, OR# 099-05-087 for Laser Eye Protection, and the joint Air Force/Navy (CAF-208-93) for an Aerospace Control Helmet Mounted Cueing System.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Advanced Technology Crew Station | 1.329 | 1.158 | 1.491 | 0.000 | 1.491 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Continue to mature aviation physiologic monitoring, warning system and its integration. Begin development of next generation of high resolution (9 mega pixel) color digital near to mid infra-red sensors and micro displays. Explore alternative Organic Light-Emitting Diode micro display technologies such as Wave Guide, Quantum dot, and flexible displays; and near and short wave infra-red sensor development. Explore technologies to improve aircraft seating and bodymounted equipment to increase mission endurance and enhance crashworthiness. Complete testing, and refinement as necessary, of the seat damper system and active seat cushion. | | | | | |
| ***FY 2019 Base Plans:***<br>The government will be investigating the military utility of Magnetorheological (MR)-based damping systems. The goal is to investigate the capability of MR based damping systems to withstand harsh environments found onboard military vessels while continuing to perform as designed. Prototypes delivered under this agreement will be subjected to extremely harsh conditions that are more representative of the expected. These tasks are intended to begin the process of determining the robustness of the system under long periods of exposure to | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603216N / *Aviation Survivability* | **Project (Number/Name)**<br>0584 / *Acft Protective Clothing* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| severe environments that exists onboard US Navy helicopters. Prototype goggles using new technology will begin field testing.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2018 to FY 2019 increase is due to Physiological Episode Protection efforts and Working Capitol Fund (WCF) rate increases. | | | | | |
| ***Title:*** Advanced Integrated Life Support System | 1.057 | 1.376 | 2.427 | 0.000 | 2.427 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Investigate active measures of solarization and its effect on the ballistic properties of polycarbonate / other materials. Upgrade laser protection to withstand the impact of ultra-fast (femtosecond) high intensity pulses. Continue to mature on-shore supplier of Dielectric Coatings. Investigate the optimal integration of head borne prototype systems (Helmet Mounted Displays, Enhanced Visual Acuity, Hearing Protection with Active Noise Reduction and talk through capability, Modular Helmet, etc.) for increased functionality and reduced loading on the head and spine. Mature digital human modeling capability for crew accommodation and cockpit integration. Investigate methods to reduce spinal loading during normal and emergency operations, which may include investing in additional crash testing, such as joint H-46 crash tests.<br>***FY 2019 Base Plans:***<br>The main emphasis will be on designing and constructing a working high resolution fully digital night vision goggle to be followed fully characterizing the subcomponents.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2018 to FY 2019 increase is due to Physiological Episode Protection efforts and Working Capitol Fund (WCF)rate increases. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 2.386 | 2.534 | 3.918 | 0.000 | 3.918 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603216N / *Aviation Survivability* | **Project (Number/Name)**<br>0584 / *Acft Protective Clothing* |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • OPN 4268: *Aviation Support Equipment* | 29.528 | 63.277 | 39.374 | - | 39.374 | 51.957 | 55.434 | 70.046 | 71.314 | Continuing | Continuing |

**Remarks**

**D. Acquisition Strategy**

Primary Hardware Development for the Navy Advanced Technology Crew Station efforts will be performed under a Cost Plus Fixed Fee Indefinite Delivery Indefinite Quantity contract.

**E. Performance Metrics**

Develop advanced crashworthy system level models, investigate improved visual search methodologies, and improve the ability to assess cockpit compatibility through new analytic approaches to anthropometry.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603216N / *Aviation Survivability* | Project (Number/Name)<br>0584 / *Acft Protective Clothing* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Systems Engineering | WR | NAWCAD : Pax River MD | 34.037 | 0.945 | Dec 2016 | 0.550 | Dec 2017 | 0.637 | Dec 2018 | - | | 0.637 | Continuing | Continuing | Continuing |
| Primary Hardware Development | C/CPFF | Intevac : San Jose CA | 5.118 | 0.000 | Jun 2017 | 0.489 | Jun 2018 | 1.500 | Jun 2019 | - | | 1.500 | 0.000 | 7.107 | 7.107 |
| Primary Hardware Development | MIPR | US Army CERDEC : Ft. Belvoir VA | 3.495 | 0.020 | Jun 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.515 | 3.515 |
| Primary Hardware Development | C/CPFF | Innovital : Calverton MD | 0.000 | 0.145 | Dec 2016 | 0.488 | Dec 2017 | 0.450 | Dec 2018 | - | | 0.450 | 0.000 | 1.083 | 1.083 |
| Prior Year Prod Dev no Longer Funded in Budget Year or Outyears | Various | Various : Various | 23.340 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 23.340 | 23.340 |
| Systems Engineering | WR | NAWCWD : China Lake CA | 0.000 | 0.040 | Aug 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.040 | - |
| | | **Subtotal** | 65.990 | 1.150 | | 1.527 | | 2.587 | | - | | 2.587 | Continuing | Continuing | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Configuration Management | WR | NAWCAD : Pax River MD | 2.594 | 0.413 | Dec 2016 | 0.330 | Dec 2017 | 0.490 | Dec 2018 | - | | 0.490 | Continuing | Continuing | Continuing |
| Prior Year Support no Longer Funded in Budget Year or Outyears | Various | Various : Various | 3.232 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.232 | 3.232 |
| | | **Subtotal** | 5.826 | 0.413 | | 0.330 | | 0.490 | | - | | 0.490 | Continuing | Continuing | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Developmental Test & Evaluation | WR | NAWCAD : Pax River MD | 5.018 | 0.498 | Dec 2016 | 0.320 | Dec 2017 | 0.551 | Dec 2018 | - | | 0.551 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603216N / *Aviation Survivability* | **Project (Number/Name)**<br>0584 / *Acft Protective Clothing* |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Prior Year T&E no Longer Funded in Budget Year or Outyears | Various | Various : Various | 18.240 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 18.240 | 18.240 |
| | | **Subtotal** | 23.258 | 0.498 | | 0.320 | | 0.551 | | - | | 0.551 | Continuing | Continuing | N/A |

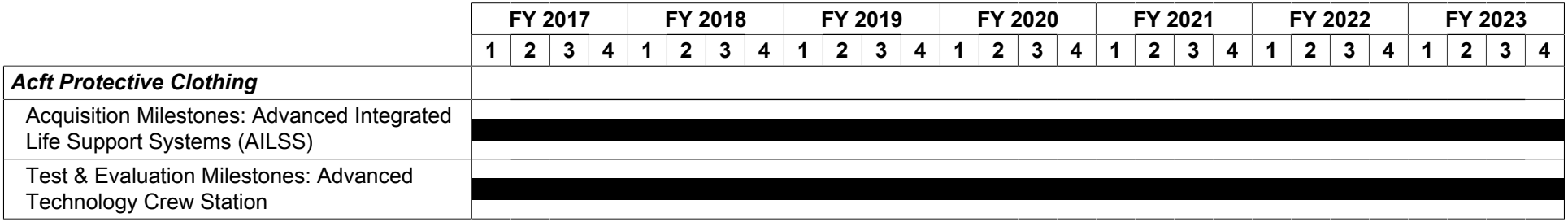
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management Support | WR | NAWCAD : Pax River MD | 3.780 | 0.315 | Dec 2016 | 0.342 | Dec 2017 | 0.275 | Dec 2018 | - | | 0.275 | Continuing | Continuing | Continuing |
| Travel | PO | NAVAIR : Pax River MD | 0.471 | 0.010 | Oct 2016 | 0.015 | Oct 2017 | 0.015 | Oct 2018 | - | | 0.015 | Continuing | Continuing | Continuing |
| Prior Year Mgmt Svcs no Longer Funded in Budget Year or Outyears | Various | Various : Various | 0.010 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.010 | 0.010 |
| | | **Subtotal** | 4.261 | 0.325 | | 0.357 | | 0.290 | | - | | 0.290 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 99.335 | 2.386 | | 2.534 | | 3.918 | | - | | 3.918 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603216N / *Aviation Survivability* | **Project (Number/Name)**<br>0584 / *Acft Protective Clothing* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603216N / *Aviation Survivability* | **Project (Number/Name)**<br>0584 / *Acft Protective Clothing* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Acft Protective Clothing*** | | | | |
| Acquisition Milestones: Advanced Integrated Life Support Systems (AILSS) | 1 | 2017 | 4 | 2023 |
| Test & Evaluation Milestones: Advanced Technology Crew Station | 1 | 2017 | 4 | 2023 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603216N / *Aviation Survivability* | Project (Number/Name)<br>0591 / *Acft Survivability, Vulnerability & Safety* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0591: *Acft Survivability, Vulnerability & Safety* | 45.261 | 1.343 | 1.385 | 1.502 | - | 1.502 | 1.512 | 1.543 | 1.572 | 1.605 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Aircraft Survivability, Vulnerability and Safety. This project develops prototype hardware to improve the survivability of Navy and Marine Corps aircraft. This project addresses the likelihood of an aircraft being hit (susceptibility) and the probability of a kill if the aircraft is hit (vulnerability). Types of programs funded under this project include signature reduction efforts, subsystem and component hardening and development of fire and explosion suppression techniques for fuel systems.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Technology Requirements | 0.181 | 0.035 | 0.045 | 0.000 | 0.045 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Maintain a comprehensive Survivability Master Plan; assess technologies to identify survivability gaps as part of the OPNAV Aircraft Survivability Investment Strategy (OASIS); mature survivability assessment processes; support rotary wing and fixed wing programmatic requirements for survivability studies, assessments, and analyses.<br>***FY 2019 Base Plans:***<br>Planned trade studies include threats assessments, vulnerability assessments of both rotary wing and fixed wing aircraft, and updates to the Survivability Master Plan.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Budget increase from FY 2018 to FY 2019 supports additional iASE technical evaluations. | | | | | |
| ***Title:*** Technology Design & Development | 0.944 | 1.298 | 1.437 | 0.000 | 1.437 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Develop recommended courses of action to resolve survivability deficiencies; develop and support Integrated Aircraft Survivability Equipment (iASE) initiatives; manage, coordinate, or develop iASE capabilities and | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603216N / *Aviation Survivability* | **Project (Number/Name)**<br>0591 / *Acft Survivability, Vulnerability & Safety* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| transition to programs of record. Begin investigating Virtual Electronic Combat Training System (VECTS) CH-53K integration concept; support MH-60R Tactical Demonstration to include Electric-Optical/Infrared and Radio Frequency threats; and provide coordinated support to update VECTS as needed for radar warning receiver APR-39 C(V2).<br>***FY 2019 Base Plans:***<br>Integrate results from technology evaluation efforts to address program office survivability shortfalls with specific emphasis on iASE capability.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Budget increase from FY 2018 to FY 2019 supports additional iASE technical evaluations. | | | | | |
| ***Title:*** Technology Test & Evaluation | 0.218 | 0.052 | 0.020 | 0.000 | 0.020 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Determine performance values for technologies to support survivability requirements; assess optimal cueing and informational displays to enhance aircrew situational awareness and facilitate susceptibility reduction techniques; support flight testing of prototype hardware and software solutions for Integrated Aircraft Survivability Equipment; develop, manage or support survivability technology demonstrations.<br>***FY 2019 Base Plans:***<br>Implement test planning simulation solutions in a laboratory environment.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No significant change from FY 2018 to FY 2019. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 1.343 | 1.385 | 1.502 | 0.000 | 1.502 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603216N / *Aviation Survivability* | **Project (Number/Name)**<br>0591 / *Acft Survivability, Vulnerability & Safety* |

**C. Other Program Funding Summary ($ in Millions)**

**Remarks**

**D. Acquisition Strategy**

Primary Hardware Development will be performed under either a Cost Plus Fixed Fee or a Firm Fixed Price contract.

**E. Performance Metrics**

Evaluate 100% of deployed/developmental United States Navy/United States Marine Corp aircraft platforms for survivability deficiencies using Navy gap analysis as baseline. Identify prototype hardware solutions to address 25% to 50% of deficiencies, and initiate a minimum of two new demonstration projects per year.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603216N / *Aviation Survivability* | **Project (Number/Name)**<br>0591 / *Acft Survivability, Vulnerability & Safety* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Systems Engineering | WR | NAWCAD : Pax River, MD | 12.856 | 0.144 | Oct 2016 | 0.130 | Oct 2017 | 0.207 | Oct 2018 | - | | 0.207 | Continuing | Continuing | Continuing |
| Systems Engineering | WR | NAWCWD : China Lake, CA | 0.328 | 0.025 | Oct 2016 | 0.000 | | 0.030 | Oct 2018 | - | | 0.030 | 0.000 | 0.383 | 0.383 |
| Systems Engineering | MIPR | DTIC : Ft. Belvoir, VA | 0.520 | 0.000 | Jan 2017 | 0.193 | Jan 2018 | 0.600 | Jan 2019 | - | | 0.600 | 0.000 | 1.313 | 1.313 |
| System Engineering | C/CPFF | Engility : Chantilly, VA | 1.472 | 1.136 | Oct 2016 | 0.975 | Oct 2017 | 0.600 | Oct 2018 | - | | 0.600 | 0.000 | 4.183 | 4.183 |
| Prior Year Prod Dev cost no longer funded in FYDP | Various | Various : Various | 17.692 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 17.692 | 17.692 |
| | | **Subtotal** | 32.868 | 1.305 | | 1.298 | | 1.437 | | - | | 1.437 | Continuing | Continuing | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Prior Year Support cost no longer funded in FYDP | Various | Various : Various | 4.569 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 4.569 | 4.569 |
| | | **Subtotal** | 4.569 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 4.569 | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Developmental Test & Evaluation | WR | NAWCAD : Patuxent River, MD | 2.434 | 0.000 | Oct 2016 | 0.050 | Oct 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Developmental Test & Evaluation | WR | NAWCWD : China Lake, CA | 0.000 | 0.000 | | 0.000 | | 0.020 | Feb 2019 | - | | 0.020 | 0.000 | 0.020 | 0.020 |
| Prior Year T&E cost no longer funded in FYDP | Various | Various : Various | 2.995 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.995 | 2.995 |
| | | **Subtotal** | 5.429 | 0.000 | | 0.050 | | 0.020 | | - | | 0.020 | Continuing | Continuing | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603216N / *Aviation Survivability* | **Project (Number/Name)**<br>0591 / *Acft Survivability, Vulnerability & Safety* |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

**Remarks**

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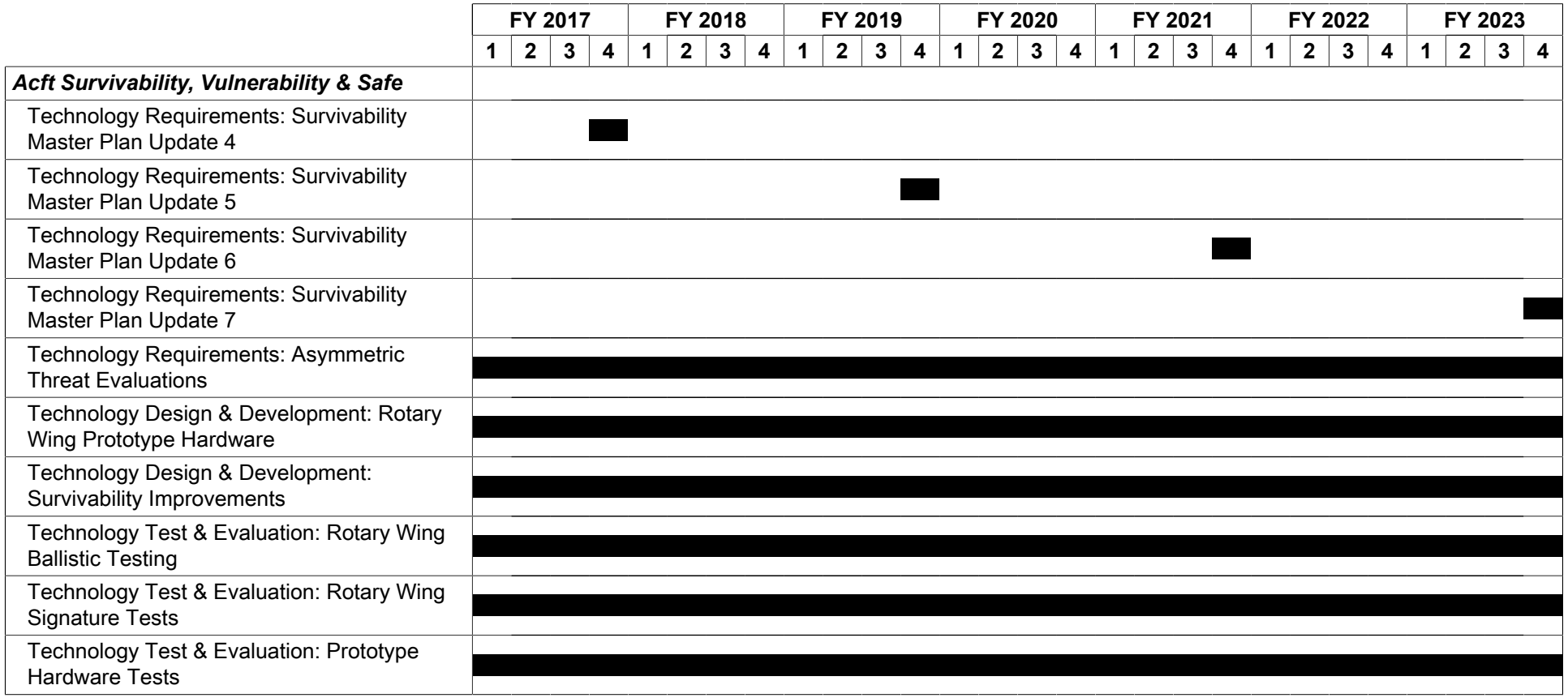
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management Support | WR | NAWCAD : Pax River, MD | 1.680 | 0.033 | Oct 2016 | 0.032 | Oct 2017 | 0.045 | Oct 2018 | - | | 0.045 | Continuing | Continuing | Continuing |
| Travel | PO | NAVAIR : Patuxent River, MD | 0.375 | 0.005 | Oct 2016 | 0.005 | Oct 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Prior Year Mgmt cost no longer funded in FYDP | Various | Various : Various | 0.340 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.340 | 0.340 |
| | | **Subtotal** | 2.395 | 0.038 | | 0.037 | | 0.045 | | - | | 0.045 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 45.261 | 1.343 | | 1.385 | | 1.502 | | - | | 1.502 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603216N / *Aviation Survivability* | **Project (Number/Name)**<br>0591 / *Acft Survivability, Vulnerability & Safety* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603216N / *Aviation Survivability* | **Project (Number/Name)**<br>0591 / *Acft Survivability, Vulnerability & Safety* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Acft Survivability, Vulnerability & Safe*** | | | | |
| Technology Requirements: Survivability Master Plan Update 4 | 4 | 2017 | 4 | 2017 |
| Technology Requirements: Survivability Master Plan Update 5 | 4 | 2019 | 4 | 2019 |
| Technology Requirements: Survivability Master Plan Update 6 | 4 | 2021 | 4 | 2021 |
| Technology Requirements: Survivability Master Plan Update 7 | 4 | 2023 | 4 | 2023 |
| Technology Requirements: Asymmetric Threat Evaluations | 1 | 2017 | 4 | 2023 |
| Technology Design & Development: Rotary Wing Prototype Hardware | 1 | 2017 | 4 | 2023 |
| Technology Design & Development: Survivability Improvements | 1 | 2017 | 4 | 2023 |
| Technology Test & Evaluation: Rotary Wing Ballistic Testing | 1 | 2017 | 4 | 2023 |
| Technology Test & Evaluation: Rotary Wing Signature Tests | 1 | 2017 | 4 | 2023 |
| Technology Test & Evaluation: Prototype Hardware Tests | 1 | 2017 | 4 | 2023 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603216N / *Aviation Survivability* | Project (Number/Name)<br>0592 / *Acft & Ordnance Safety* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0592: *Acft & Ordnance Safety* | 35.477 | 0.907 | 1.060 | 1.047 | - | 1.047 | 1.045 | 1.068 | 1.089 | 1.112 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The Aircraft and Ordnance Safety Program transitions innovative munitions safety technology to Navy and Marine Corps air weapons, to comply with the Chief of Naval Operations direction that all munitions carried aboard Navy ships be insensitive to unplanned stimuli (thermal, impact, and shock events). The Aircraft and Ordnance Safety Program also ensures the safety and protection of personnel, aircraft, ships, and operational facilities, through improved precision targeting, fail-safe ordnance, selective effects munitions and shock/blast force protection technologies.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Insensitive Munitions (IM) | 0.907 | 1.060 | 1.047 | 0.000 | 1.047 |
| ***Articles:*** | - | - | - | - | - |

***FY 2018 Plans:***

Improve Air-to-Air Demonstration: Continue Sidewinder warhead technology risk reduction evaluation in support of PMA-259 planned block II+ or III transition with digital detonation initiator, improved multi-layered case warhead design. Continue Sidewinder rocket motor technology risk reduction evaluation in support of PMA-259 planned block III transition with highly-loaded-grain, high-performance motor, and radio frequency cook-off sensor. Evaluation of Metal Matrix Composite structures was completed in FY 17.

Improve Air-Launched Weapons: Continue Insensitive Munitions (IM) and performance evaluation of a cast/cure minimum smoke composite propellant that will meet -65 degree requirement for fixed-wing platforms. Testing will be done in a Hellfire configuration to demonstrate transition ability to a system with equivalent requirements in support of PMA 242 tier III requirements. Continue evaluation of Highly-loaded-grain high performance rocket motor and application of Slow-cook-off-sensor technology in Advanced Anti-Radiation Guided Missile (AARGM) configuration for transition to PMA 242 AARGM BLKII upgrade.

Advanced Containment/Case/Warhead Materials: Demonstrate IM performance of the Joint Multiple Effects Warhead System in the new revised configuration for transition to PMA 280 FY 19 planned warhead upgrade. Initiate IM and Operational performance evaluation of Eutectic Metal Composite (EMC) for Rocket Motor and Warhead components. EMC technology provides improved material strength properties and the ability to produce structures with advanced configurations that would potentially enhance both IM and operational performance.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603216N / *Aviation Survivability* | **Project (Number/Name)**<br>0592 / *Acft & Ordnance Safety* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Shock/Blast Barrier Protection Modeling, Demonstration, and Testing: Continue tech-watch investigation for effective, affordable blast barrier and impact mitigation for application to Tomahawk weapon.<br><br>Advanced Energetic Materials: Initiate evaluation of a JIMTP transition new explosive fill for BLU 111 to address Navy unique issues (i.e., irreversible growth, explosive train reliability for a very insensitive main fill, and thermal environments and ullage requirements for the fill to ensure improved IM demonstrated in JIMTP.<br>***FY 2019 Base Plans:***<br>Air-to-Air Demonstration: Continue Sidewinder warhead technology risk reduction evaluation in support of PMA-259 planned block II+ or III transition with digital detonation initiator, improved multi-layered case warhead design. Continue Sidewinder rocket motor technology risk reduction evaluation in support of PMA-259 planned block III transition with highly-loaded-grain, high-performance motor, and radio frequency cook-off sensor. Evaluation of Metal Matrix Composite structures for use with Min-Smoke propellants for use in HELLFIRE.<br><br>Improve Air-Launched Weapons: Continue Insensitive Munitions (IM) and performance evaluation of a cast/cure minimum smoke composite propellant that will meet -65 degree requirement for fixed-wing platforms. Testing will be done in a Hellfire configuration to demonstrate transition ability to a system with equivalent requirements in support of PMA 242 tier III requirements. Continue evaluation of Highly-loaded-grain high performance rocket motor and application of Slow-cook-off-sensor technology in Advanced Anti-Radiation Guided Missile (AARGM) configuration for transition to PMA 242 AARGM BLK II upgrade.<br><br>Advanced Containment/Case/Warhead Materials: Demonstrate IM performance of the Joint Multiple Effects Warhead System in the new revised configuration for transition to PMA 280 FY 19 planned warhead upgrade. Initiate IM and Operational performance evaluation of Eutectic Metal Composite (EMC) for Rocket Motor and Warhead components. EMC technology provides improved material strength properties and the ability to produce structures with advanced configurations that would potentially enhance both IM and operational performance.<br><br>Shock/Blast Barrier Protection Modeling, Demonstration, and Testing: Continue tech-watch investigation for effective, affordable blast barrier and impact mitigation for application to Tomahawk weapon.<br><br>Advanced Energetic Materials: Continue evaluation of a Joint Service Insensitive Munitions Technology Program (JIMTP) transition new explosive fill for Bomb Live Unit 111 to address Navy unique issues (i.e., | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603216N / *Aviation Survivability* | **Project (Number/Name)**<br>0592 / *Acft & Ordnance Safety* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| irreversible growth, explosive train reliability for a very insensitive main fill, and thermal environments and ullage requirements for the fill to ensure improved IM demonstrated in JIMTP).<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No significant change from FY 2018 to FY 2019. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.907 | 1.060 | 1.047 | 0.000 | 1.047 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

All planned programs are accomplished via civilian labor and use of government testing facilities.

**E. Performance Metrics**

The Aircraft and Ordnance Safety program will initiate six to nine technology development/maturation efforts to improve IM signature and will work to transition those technologies to weapons programs. The weapons programs will be chosen based on PEO(U&W) weapons portfolio and will focus on the priority weapons as defined in the IM strategic plan.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603216N / *Aviation Survivability* | Project (Number/Name)<br>0592 / *Acft & Ordnance Safety* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Systems Engineering | WR | NAWCWD : China Lake, CA | 35.469 | 0.907 | Oct 2016 | 1.060 | Oct 2017 | 1.047 | Oct 2018 | - | | 1.047 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 35.469 | 0.907 | | 1.060 | | 1.047 | | - | | 1.047 | Continuing | Continuing | N/A |

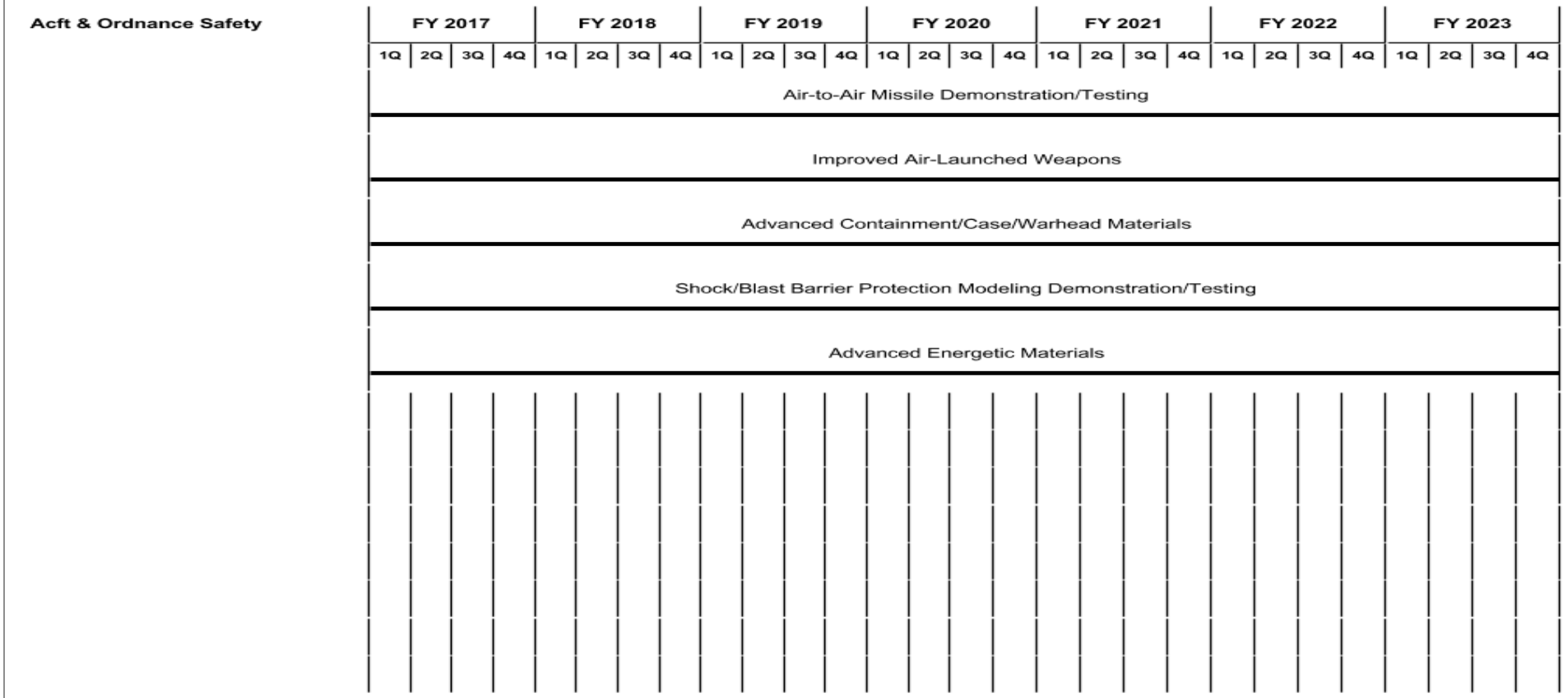
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Prior Year Mgmt no longer funded in FYDP | Various | Various : Various | 0.008 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.008 | 0.008 |
| | | **Subtotal** | 0.008 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.008 | N/A |

| | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 35.477 | 0.907 | | 1.060 | | 1.047 | | - | | 1.047 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603216N / *Aviation Survivability* | **Project (Number/Name)**<br>0592 / *Acft & Ordnance Safety* |




*2019DON - 0603216N - 0592*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603216N / *Aviation Survivability* | **Project (Number/Name)**<br>0592 / *Acft & Ordnance Safety* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Acft & Ordnance Safety*** | | | | |
| Air-to-Air Missile Demonstration/Testing | 1 | 2017 | 4 | 2023 |
| Improved Air-Launched Weapons | 1 | 2017 | 4 | 2023 |
| Advanced Containment/Case/Warhead Materials | 1 | 2017 | 4 | 2023 |
| Shock/Blast Barrier Protection Modeling Demonstration/Testing | 1 | 2017 | 4 | 2023 |
| Advanced Energetic Materials | 1 | 2017 | 4 | 2023 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603216N / *Aviation Survivability* | Project (Number/Name)<br>1819 / *CV Acft Fire Suppress System* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1819: *CV Acft Fire Suppress System* | 3.133 | 0.504 | 0.587 | 0.583 | - | 0.583 | 0.598 | 0.609 | 0.620 | 0.634 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

This project develops improved fire-fighting systems and fire protective measures for aircraft-related fires on aircraft carriers, including assessment of fire properties, definition of fire threats, improvements to fire-fighting agents and delivery systems, fire detection and suppression system performance evaluations, and fire-fighter training improvements.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Fire-Fighting | 0.504 | 0.587 | 0.583 | 0.000 | 0.583 |
| ***Articles:*** | - | - | - | - | - |

***FY 2018 Plans:***

Continue support for Naval Air Training and Operating Procedures Standardization improvements, and modeling and simulation for fire prediction. Continue monitoring aqueous film forming foam developments and other clean agents. Continue project looking at firefighter issues related to unmanned air vehicle systems including composites, weapons and fuels. Evaluate training and certification requirements and equipment to bring the ship up to aviation boatswains mate capabilities and readiness for Auxiliary Crane Support ships that rely on the ships damage control team and limited resources. Continue to evaluate equipment improvements for saws, spreaders, and other improvements to reduce or discontinue the use of Motor Gasoline on ships. Finalize evaluations for flash-hood, crash-fire-rescue face shield and firefighter personnel floatation device improvements. Continue to monitor and recommend Electromagnetic Aircraft Launch Systems fire doctrine, Carrier Fixed Wing Aircraft Nuclear hangar bay conflagration management system operations, and unmanned carrier launched airborne surveillance and strike firefighting operations impacts. Develop procedures to be used aboard ship to rapidly and safely extinguished deep seated smoldering fires with composite materials.

***FY 2019 Base Plans:***

Continue support for Naval Air Training and Operating Procedures Standardization improvements, and modeling and simulation for fire prediction. Continue monitoring aqueous film forming foam developments and other clean agents. Continue to monitor new equipment improvements for saws, spreaders, and other improvements to reduce or discontinue the use of Motor Gasoline on ships. Finalize evaluations for flash-hood, crash-fire-rescue face shield and firefighter personnel floatation device improvements. Continue to monitor and recommend Electromagnetic Aircraft Launch Systems fire doctrine, Carrier Fixed Wing Aircraft Nuclear

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603216N / *Aviation Survivability* | **Project (Number/Name)**<br>1819 / *CV Acft Fire Suppress System* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| hangar bay conflagration management system operations, and unmanned carrier launched airborne surveillance and strike firefighting operations impacts. Finalize project looking at firefighter issues related to composites, weapons and fuels and develop procedures to be used aboard ship to rapidly and safely extinguished deep seated smoldering fires with composite materials. Continue to evaluate training and certification requirements and equipment to bring the ship up to aviation boatswains mate capabilities and readiness for Air Capable Ships, ships that rely on the ships damage control team and limited resources. Continue improved weapons cooling scenario testing. Begin project looking at options for firefighter equipment storage on CVN's and LHA/D ships.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No significant change from FY 2018 to FY 2019. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.504 | 0.587 | 0.583 | 0.000 | 0.583 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

This is a non-ACAT program. Procurement strategy is determined by market survey and cooperative opportunities.

**E. Performance Metrics**

The Carrier Aircraft Fire Suppression (CAFS) program will, at a minimum, fund six to ten projects per year that investigate and evaluate tactical capability gaps and potential capability improvements regarding shipboard aircraft fire suppression doctrine and equipment. CAFS projects will have a greater than 90% success rate of insertion into Department of the Navy shipboard aircraft fire-fighting procedures and documentation.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603216N / *Aviation Survivability* | Project (Number/Name)<br>1819 / *CV Acft Fire Suppress System* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Systems Engineering | C/CPFF | ICI : Virginia Beach, VA | 0.020 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.020 | 0.020 |
| Systems Engineering | WR | NAWCWD : China Lake, CA | 0.027 | 0.087 | Oct 2016 | 0.085 | Oct 2017 | 0.042 | Oct 2018 | - | | 0.042 | Continuing | Continuing | Continuing |
| Systems Engineering | C/CPFF | Hughes Associates : Baltimore, MD | 0.027 | 0.005 | Nov 2016 | 0.025 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.057 | 0.057 |
| Systems Engineering | C/CPFF | AVW : Chesapeake, VA | 0.013 | 0.000 | | 0.000 | | 0.015 | Nov 2018 | - | | 0.015 | 0.000 | 0.028 | 0.028 |
| Prior Yr Prod Dev no longer funded in the FYDP | Various | Various : Various | 0.220 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.220 | 0.220 |
| Systems Engineering | WR | NRL : Washington, DC | 0.006 | 0.001 | May 2017 | 0.018 | May 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.313 | 0.093 | | 0.128 | | 0.057 | | - | | 0.057 | Continuing | Continuing | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Engineering Support | C/CPFF | ICI : Virginia Beach, VA | 0.105 | 0.000 | | 0.000 | | 0.027 | Nov 2018 | - | | 0.027 | 0.000 | 0.132 | 0.132 |
| Engineering Support | WR | NAWCWD : China Lake, CA | 0.223 | 0.134 | Oct 2016 | 0.100 | Oct 2017 | 0.150 | Oct 2018 | - | | 0.150 | Continuing | Continuing | Continuing |
| Engineering Support | C/CPFF | Hughes Associates : Baltimore, MD | 0.027 | 0.020 | Nov 2016 | 0.050 | Nov 2017 | 0.035 | Nov 2018 | - | | 0.035 | 0.000 | 0.132 | 0.132 |
| Engineering Support | C/CPFF | AVW : Chesapeake, VA | 0.074 | 0.040 | Nov 2016 | 0.035 | Nov 2017 | 0.035 | Nov 2018 | - | | 0.035 | 0.000 | 0.184 | 0.184 |
| Engineering Support | WR | NRL : Washington, DC | 0.000 | 0.001 | May 2017 | 0.018 | May 2018 | 0.005 | May 2019 | - | | 0.005 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.429 | 0.195 | | 0.203 | | 0.252 | | - | | 0.252 | Continuing | Continuing | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603216N / *Aviation Survivability* | Project (Number/Name)<br>1819 / *CV Acft Fire Suppress System* | |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Technology Test & Evaluation | WR | NAWCWD : China Lake, CA | 1.392 | 0.044 | Oct 2016 | 0.150 | Oct 2017 | 0.167 | Oct 2018 | - | | 0.167 | Continuing | Continuing | Continuing |
| Technology Test & Evaluation | C/FFP | Hughes Associates : Baltimore, MD | 0.538 | 0.015 | Nov 2016 | 0.025 | Nov 2017 | 0.050 | Nov 2018 | - | | 0.050 | 0.000 | 0.628 | 0.628 |
| Technology Test & Evaluation | C/CPFF | AVW : Chesapeake, VA | 0.012 | 0.010 | Nov 2016 | 0.015 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.037 | 0.037 |
| Prior yr T&E no longer funded in the FYDP | Various | Various : Various | 0.292 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 2.234 | 0.069 | | 0.190 | | 0.217 | | - | | 0.217 | Continuing | Continuing | N/A |

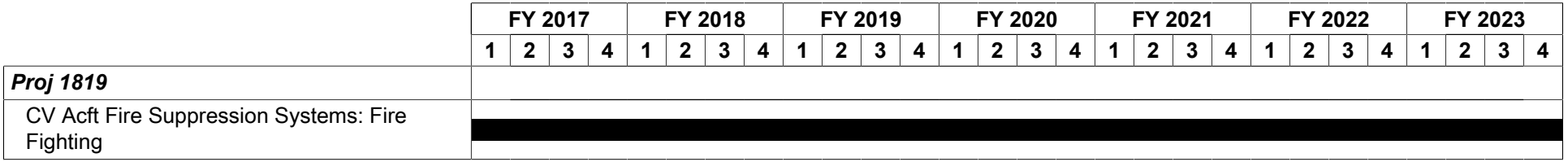
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management | WR | NAWCWD : China Lake, CA | 0.157 | 0.147 | Oct 2016 | 0.066 | Oct 2017 | 0.057 | Oct 2018 | - | | 0.057 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.157 | 0.147 | | 0.066 | | 0.057 | | - | | 0.057 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 3.133 | 0.504 | | 0.587 | | 0.583 | | - | | 0.583 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603216N / *Aviation Survivability* | **Project (Number/Name)**<br>1819 / *CV Acft Fire Suppress System* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603216N / *Aviation Survivability* | **Project (Number/Name)**<br>1819 / *CV Acft Fire Suppress System* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 1819*** | | | | |
| CV Acft Fire Suppression Systems: Fire Fighting | 1 | 2017 | 4 | 2023 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603216N / *Aviation Survivability* | Project (Number/Name)<br>9999 / *Congressional Adds* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9999: *Congressional Adds* | 0.017 | 9.671 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 9.688 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

Internal realignment being done to move this funding to the correct PE 0603261N.

**A. Mission Description and Budget Item Justification**

Congressional add. Funds are aligned to the Tactical Airborne Reconnaissance for enhanced mission intelligence, surveillance, and reconnaissance performance.

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2017 | FY 2018 |
|---|---|---|
| ***Congressional Add:*** Program Increase | 9.671 | 0.000 |
| ***FY 2017 Accomplishments:*** Congressional add. Funds are aligned to the Tactical Airborne Reconnaissance for enhanced mission intelligence, surveillance, and reconnaissance performance. | | |
| ***FY 2018 Plans:*** N/A | | |
| **Congressional Adds Subtotals** | 9.671 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

**E. Performance Metrics**

Congressional add to be determined.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603216N / *Aviation Survivability* | Project (Number/Name)<br>9999 / *Congressional Adds* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Systems Engineering | Various | TBD : TBD | 0.017 | 9.671 | Sep 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 9.688 | - |
| | | **Subtotal** | 0.017 | 9.671 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 9.688 | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Government Engineering | WR | NAWCAD : Patuxent River, MD | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | N/A |

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management Support | WR | NAWCAD : Patuxent River, MD | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.017 | 9.671 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 9.688 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603216N / *Aviation Survivability* | **Project (Number/Name)**<br>9999 / *Congressional Adds* |

| | FY 2017 | | | | FY 2018 | | | | FY 2019 | | | | FY 2020 | | | | FY 2021 | | | | FY 2022 | | | | FY 2023 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| ***Proj 9999*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Unmanned Systems Integration to National Airspace System: Congressional Add | | | | [redacted] | | | | | | | | | | | | | | | | | | | | | | | | |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603216N / *Aviation Survivability* | **Project (Number/Name)**<br>9999 / *Congressional Adds* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 9999*** | | | | |
| Unmanned Systems Integration to National Airspace System: Congressional Add | 4 | 2017 | 2 | 2018 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603251N *I (U)AIRCRAFT SYSTEMS* |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Program Element | 18.988 | 1.519 | 0.695 | 0.793 | - | 0.793 | 1.508 | 1.522 | 1.549 | 1.581 | Continuing | Continuing |
| 3331: *C-2 System Development* | 18.988 | 1.519 | 0.695 | 0.793 | - | 0.793 | 1.508 | 1.522 | 1.549 | 1.581 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

This program element supports the study, evaluation, optimization and enhancements of fielded aircraft systems not supported by a system specific Research, Development, Test and Evaluation, Navy program element. The supported efforts will provide a basis to recommend options for improved efficiency, minimization of life cycle cost, and other affordable options. As naval aircraft systems age, and analysis of the programmatic and /or reliability enhancements options allows the Department of the Navy to more effectively understand and manage system lifecycle costs and implications in future airborne platforms.

This program is funded under ADVANCED COMPONENT DEVELOPMENT AND PROTOTYPES because it includes all efforts necessary to evaluate integrated technologies, representative models or prototype systems in a high fidelity and realistic operating environment.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 1.519 | 0.695 | 0.815 | - | 0.815 |
| Current President's Budget | 1.519 | 0.695 | 0.793 | - | 0.793 |
| Total Adjustments | 0.000 | 0.000 | -0.022 | - | -0.022 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | - | - | | | |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -0.022 | - | -0.022 |

**Change Summary Explanation**

Technical: Not applicable.
Schedule: Not applicable.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603251N / *(U)AIRCRAFT SYSTEMS* | Project (Number/Name)<br>3331 / *C-2 System Development* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3331: *C-2 System Development* | 18.988 | 1.519 | 0.695 | 0.793 | - | 0.793 | 1.508 | 1.522 | 1.549 | 1.581 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The C-2A Greyhound is a high wing monoplane, twin engine turbo-prop aircraft capable of operating from both a shore base and all operational United States Navy aircraft carrier classes. The mission of the C-2A is to provide rapid response Carrier Onboard Delivery of fleet essential supplies, repair parts, and personnel to sustain at sea operations of deployed battle groups. In addition, the C-2A provides airdrop delivery and mobilization support for special operations forces from land bases and carriers, Search and Rescue, and Humanitarian Relief.

This project will fund required development, analysis, and testing of ARC-210 upgrade and other subsystems required to operate the C-2A to the end of its service life.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Combat Readiness | 1.519 | 0.695 | 0.793 | 0.000 | 0.793 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** C-2 Combat Readiness establishes an enduring capacity to address obsolescence, safety, and readiness degrader issues for the C-2A(R) aircraft until the end of it's service life. | | | | | |
| ***FY 2018 Plans:***<br>Continuation of C-2A subsystems studies and analysis. | | | | | |
| ***FY 2019 Base Plans:***<br>Continuation of C-2A subsystems studies and analysis. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY19 funding increased of $0.098 based on original program plan. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 1.519 | 0.695 | 0.793 | 0.000 | 0.793 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • APN/0556: *C-2A Series* | 18.971 | 18.673 | 10.327 | - | 10.327 | 20.826 | 17.538 | 0.000 | 0.000 | 8.399 | 558.965 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603251N / *(U)AIRCRAFT SYSTEMS* | **Project (Number/Name)**<br>3331 / *C-2 System Development* |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|

**Remarks**

**D. Acquisition Strategy**

The C-2 Operational Ground Controllability strategy will be exercised under an Engineering Change Proposal.

**E. Performance Metrics**

Test and Evaluation 3Q FY17. C-2A Hydraulic Systems studies and analysis final report 4Q FY17.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603251N / *(U)AIRCRAFT SYSTEMS* | Project (Number/Name)<br>3331 / *C-2 System Development* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Primary Hardware Development | SS/CPFF | NGC : Bethpage, NY | 10.370 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 10.370 | 10.370 |
| Primary Hardware Development | SS/FFP | Rockwell Collins Inc. : Cedar Rapids, IA | 0.156 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.156 | 0.156 |
| System Engineering | SS/CPFF | NGC : Melbourne, FL | 0.603 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.603 | 0.603 |
| Prior year Prod Dev no longer funded in the FYDP | Various | Various : Various | 0.022 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.022 | 0.022 |
| | | **Subtotal** | 11.151 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 11.151 | N/A |

**Remarks**

Totals may not add due to rounding.

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Government Engineering Support | WR | NAWCAD : Pax River, MD | 4.143 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 4.143 | - |
| Government Engineering Support | WR | North Island : North Island, CA | 1.285 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.285 | - |
| Development Support | WR | North Island : North Island, CA | 0.440 | 0.409 | Dec 2016 | 0.685 | Nov 2017 | 0.793 | Nov 2018 | - | | 0.793 | Continuing | Continuing | Continuing |
| ILS Support | WR | North Island : North Island, CA | 0.045 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Prior year Support no longer funded in the FYDP | Various | Various : Various | 0.100 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.100 | - |
| | | **Subtotal** | 6.013 | 0.409 | | 0.685 | | 0.793 | | - | | 0.793 | Continuing | Continuing | N/A |

**Remarks**

Totals may not add due to rounding.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603251N / *(U)AIRCRAFT SYSTEMS* | Project (Number/Name)<br>3331 / *C-2 System Development* | |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Developmental Test & Evaluation | WR | NAWCAD : Pax River, MD | 1.808 | 1.100 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 1.808 | 1.100 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | N/A |

**Remarks**

Totals may not add due to rounding.

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Travel | Various | Various : Various | 0.016 | 0.010 | Oct 2016 | 0.010 | Oct 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.016 | 0.010 | | 0.010 | | 0.000 | | - | | 0.000 | Continuing | Continuing | N/A |

**Remarks**

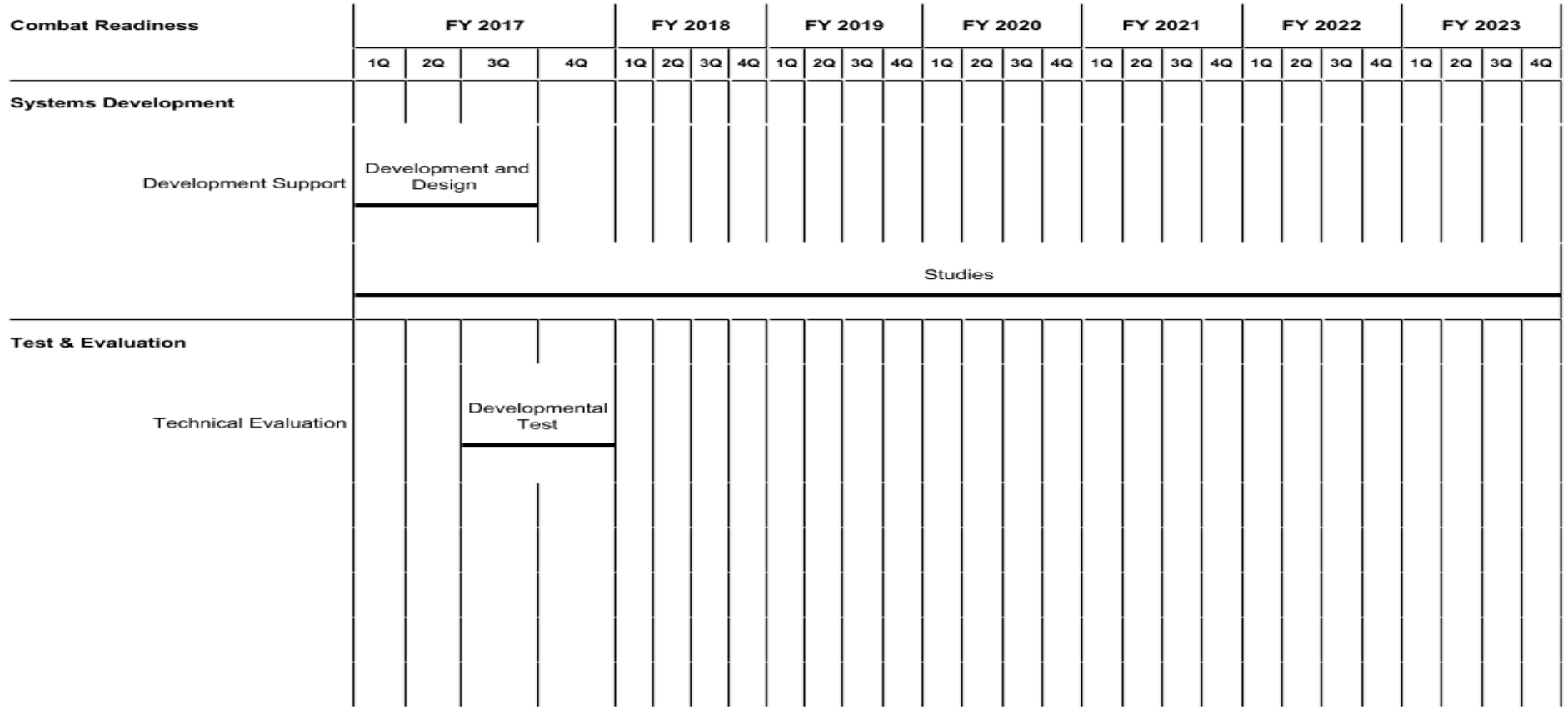
Totals may not add due to rounding.

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 18.988 | 1.519 | | 0.695 | | 0.793 | | - | | 0.793 | Continuing | Continuing | N/A |

**Remarks**

Totals may not add due to rounding.

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603251N / *(U)AIRCRAFT SYSTEMS* | **Project (Number/Name)**<br>3331 / *C-2 System Development* |




*2019PB - 0603251N - 3331*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603251N / *(U)AIRCRAFT SYSTEMS* | **Project (Number/Name)**<br>3331 / *C-2 System Development* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Combat Readiness*** | | | | |
| Systems Development: Development Support: Development Support | 1 | 2017 | 3 | 2017 |
| Systems Development: Development Support: Studies | 1 | 2017 | 4 | 2023 |
| Test & Evaluation: Technical Evaluation: Developmental Test | 3 | 2017 | 4 | 2017 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603254N *I ASW Systems Development* |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Program Element | 121.895 | 6.877 | 7.661 | 7.058 | - | 7.058 | 7.184 | 7.336 | 7.478 | 7.630 | Continuing | Continuing |
| 1292: *Adv ASW Sensors & Proc* | 121.895 | 6.877 | 7.661 | 7.058 | - | 7.058 | 7.184 | 7.336 | 7.478 | 7.630 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

Includes RDT&E funds for advanced development and developmental testing of airborne anti-submarine warfare (ASW) systems, including aircraft, equipment, and devices for use against all types of submarine targets.

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under ADVANCED COMPONENT DEVELOPMENT AND PROTOTYPES because it includes all efforts necessary to evaluate integrated technologies, representative models or prototype systems in a high fidelity and realistic operating environment.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 7.041 | 7.661 | 7.189 | - | 7.189 |
| Current President's Budget | 6.877 | 7.661 | 7.058 | - | 7.058 |
| Total Adjustments | -0.164 | 0.000 | -0.131 | - | -0.131 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | -0.003 | 0.000 | | | |
| • SBIR/STTR Transfer | -0.144 | 0.000 | | | |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -0.131 | - | -0.131 |
| • Congressional General Reductions Adjustments | -0.017 | - | - | - | - |

**Change Summary Explanation**

Technical: Not applicable.

Schedule:
1292. Not applicable.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603254N / *ASW Systems Development* | Project (Number/Name)<br>1292 / *Adv ASW Sensors & Proc* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1292: *Adv ASW Sensors & Proc* | 121.895 | 6.877 | 7.661 | 7.058 | - | 7.058 | 7.184 | 7.336 | 7.478 | 7.630 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

This program provides Air Anti-Submarine Warfare (ASW) effectiveness through development and maturation of advanced hardware and software associated with airborne acoustic and non-acoustic systems. This includes sensors and components, processing, post-processing, data recording and display capabilities to address regional threat scenarios against surfaced or submerged conventionally and nuclear powered submarines. Key objectives are platform accommodations of advanced active and passive sensors and components, improved detection, classification, localization, tracking, and increased capacity and flexibility to handle multi-sensor data loads. Furthermore, technologies that can be affordably implemented as payloads across fixed wing, rotary and unmanned platforms engaged in ASW, will be pursued. Programs being funded during the FYDP will evaluate technologies such as: Over the Horizon (OTH) communications, sonobuoy communication link to/ from aircraft, Distributed Netted Sensors, transient signals, and source and receiver improvement technologies that will enhance passive and multi-static active sensor systems capabilities. Programs being funded during the FYDP will provide for the development and maturation of persistent tactical search technologies that will allow transition to the localization and attack phase in all operationally relevant environments. In addition, the program will provide for the development and subsequent experimentation, including data collection and engineering measurement, of Multi-static Active Coherent sources and receivers, laser technologies, electro-optical and multi-spectral camera technologies, radar, and Magnetic Anomaly Detection (MAD) sensors. Those technologies that are deemed mature and provide increased operational capability will be approved for a production Rapid Capability Insertion (RCI) build. The test articles, which consist of passive/active sensors/components and associated processors, will support at-sea trials and experiments.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** System performance assessments | 6.877 | 7.661 | 7.058 | 0.000 | 7.058 |
| ***Articles:*** | 100 | 100 | - | - | - |
| ***FY 2018 Plans:***<br>Conduct sensor and system performance assessments and effects chains gap analyses on the next generation of Multi-Static Active Coherent system components, advancements in passive sensing and other acoustic and non-acoustic enhancements for traditional and high altitude ASW operations. The related test articles, consisting of passive/active sensors/components, models, processors and algorithms, will support execution of at-sea demonstrations and experimentation. Develop and mature prototype software for participation in at-sea experimentation and data collection. Conduct data analyses and evaluate/mature signal processing algorithms with science and technology research and development, and operational fleet-collected data. | | | | | |
| ***FY 2019 Base Plans:***<br>Conduct sensor and system performance assessments and effects chains gap analyses on the next generation of Multi-Static Active Coherent system components, advancements in passive sensing and other acoustic and | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603254N / *ASW Systems Development* | **Project (Number/Name)**<br>1292 / *Adv ASW Sensors & Proc* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| non-acoustic enhancements for traditional and high altitude ASW operations. Develop and mature prototype signal processing and hardware for data collections and at-sea experimentation. Employ the related test articles, models, processors and algorithms in at-sea demonstrations and related laboratory or in-water experiments to validate technical maturity and operational performance. Conduct data analyses to evaluate and mature the prototype hardware and signal processing algorithms leveraging science and technology, research and development, and operational fleet-collected data.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Decrease due to Navy-wide efficiencies and rate adjustments. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 6.877 | 7.661 | 7.058 | 0.000 | 7.058 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • RDT&E/0480: *ASW Sensors & Proc* | 24.544 | 33.423 | 39.020 | - | 39.020 | 43.528 | 44.448 | 45.330 | 46.236 | Continuing | Continuing |

**Remarks**

**D. Acquisition Strategy**

Develop and mature promising acoustic and non-acoustic ASW technologies that have high potential for meeting documented capability gaps and Fleet requirements. As funding permits, transition those technologies into acquisition programs of record for eventual Fleet release on ASW platforms.

**E. Performance Metrics**

Potential ASW technologies are quantitatively assessed for effect on ASW kill chain in relation to cost, schedule and performance metrics.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603254N / *ASW Systems Development* | Project (Number/Name)<br>1292 / *Adv ASW Sensors & Proc* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Primary Hdw Development | Various | Various : Various | 2.337 | 0.693 | Dec 2016 | 1.500 | Dec 2017 | 1.134 | Dec 2018 | - | | 1.134 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 2.337 | 0.693 | | 1.500 | | 1.134 | | - | | 1.134 | Continuing | Continuing | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Software Development | WR | NAWCAD : PATUXENT RIVER, MD | 4.225 | 1.000 | Dec 2016 | 1.082 | Dec 2017 | 1.050 | Dec 2018 | - | | 1.050 | 0.000 | 7.357 | - |
| Studies & Analysis | WR | NAWCAD : PATUXENT RIVER, MD | 6.681 | 1.190 | Dec 2016 | 1.000 | Dec 2017 | 1.100 | Dec 2018 | - | | 1.100 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 10.906 | 2.190 | | 2.082 | | 2.150 | | - | | 2.150 | Continuing | Continuing | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dev Test & Eval | Various | Various : Various | 21.947 | 1.900 | Dec 2016 | 1.933 | Dec 2017 | 2.000 | Dec 2018 | - | | 2.000 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 21.947 | 1.900 | | 1.933 | | 2.000 | | - | | 2.000 | Continuing | Continuing | N/A |

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Contractor Eng Spt | Various | Various : Various | 20.472 | 1.000 | Dec 2016 | 1.011 | Dec 2017 | 1.000 | Dec 2018 | - | | 1.000 | Continuing | Continuing | Continuing |
| ENG & TECH SVCS (NON-FFRDC) | Various | Various : Various | 2.894 | 0.100 | Dec 2016 | 0.100 | Dec 2017 | 0.100 | Dec 2018 | - | | 0.100 | Continuing | Continuing | Continuing |
| MGT & PROF SVCS (FFRDC) | Various | Various : Various | 1.373 | 0.100 | Dec 2016 | 0.100 | Dec 2017 | 0.100 | Dec 2018 | - | | 0.100 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603254N / *ASW Systems Development* | Project (Number/Name)<br>1292 / *Adv ASW Sensors & Proc* |

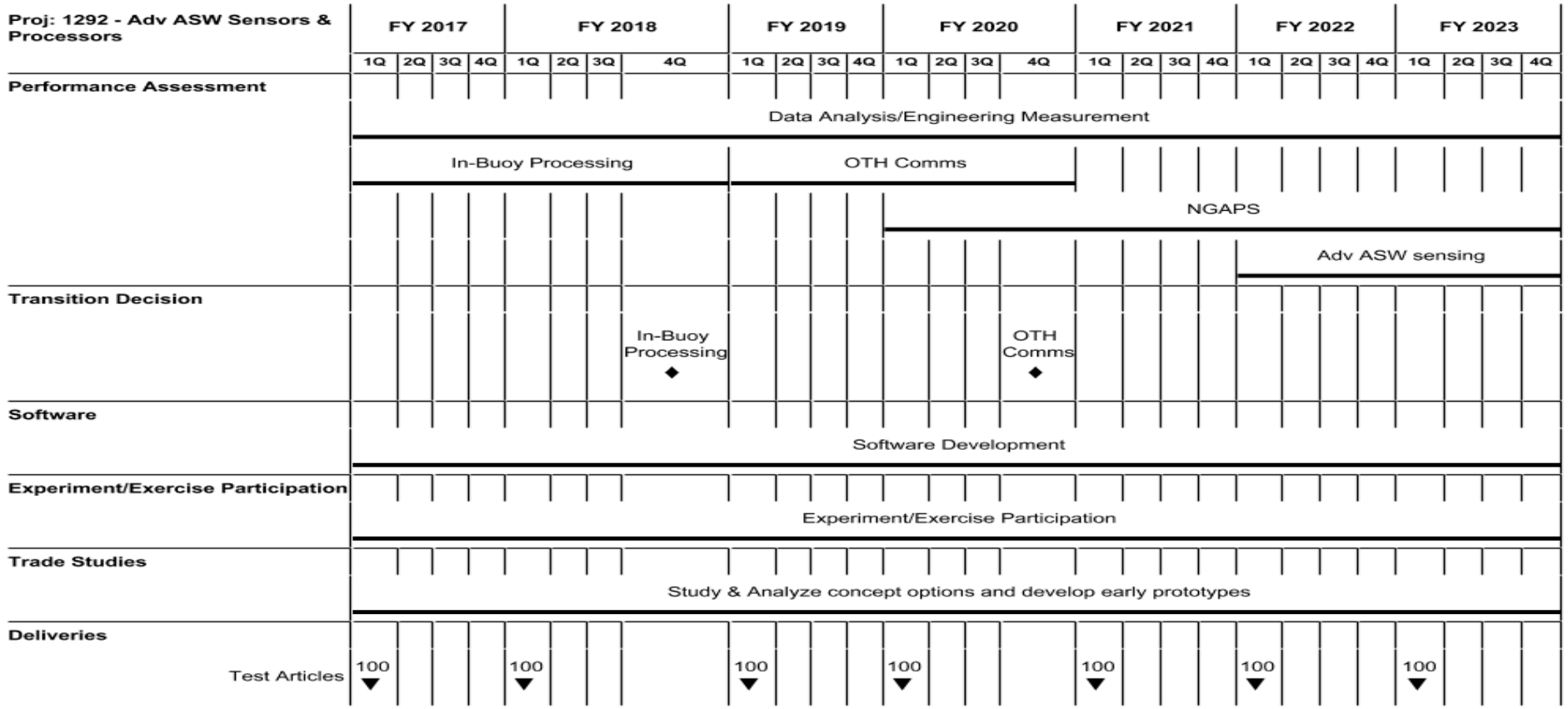
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Government Eng Spt | WR | NAWCAD : PATUXENT RIVER, MD | 61.818 | 0.886 | Dec 2016 | 0.927 | Dec 2017 | 0.566 | Dec 2018 | - | | 0.566 | Continuing | Continuing | Continuing |
| Travel | Various | VARIOUS : VARIOUS | 0.148 | 0.008 | Dec 2016 | 0.008 | Dec 2017 | 0.008 | Dec 2018 | - | | 0.008 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 86.705 | 2.094 | | 2.146 | | 1.774 | | - | | 1.774 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 121.895 | 6.877 | | 7.661 | | 7.058 | | - | | 7.058 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603254N / *ASW Systems Development* | **Project (Number/Name)**<br>1292 / *Adv ASW Sensors & Proc* |




*2019PB - 0603254N - 1292*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603254N / *ASW Systems Development* | **Project (Number/Name)**<br>1292 / *Adv ASW Sensors & Proc* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj: 1292 - Adv ASW Sensors & Processors*** | | | | |
| Performance Assessment: Data Analysis/Engineering Measurement | 1 | 2017 | 4 | 2023 |
| Performance Assessment: In-Buoy Processing | 1 | 2017 | 4 | 2018 |
| Performance Assessment: OTH Comms | 1 | 2019 | 4 | 2020 |
| Performance Assessment: Next Generation Airborne Passive System | 1 | 2020 | 4 | 2023 |
| Performance Assessment: Advanced ASW sensing | 1 | 2022 | 4 | 2023 |
| Transition Decision: In-Buoy Processing | 4 | 2018 | 4 | 2018 |
| Transition Decision: OTH Comms | 4 | 2020 | 4 | 2020 |
| Software: Software Development | 1 | 2017 | 4 | 2023 |
| Experiment/Exercise Participation: Experiment/Exercise Participation | 1 | 2017 | 4 | 2023 |
| Trade Studies: Trade Studies | 1 | 2017 | 4 | 2023 |
| Deliveries: Test Articles: Test Article Deliveries (6) | 1 | 2017 | 1 | 2017 |
| Deliveries: Test Articles: Test Article Deliveries (7) | 1 | 2018 | 1 | 2018 |
| Deliveries: Test Articles: Test Article Deliveries (8) | 1 | 2019 | 1 | 2019 |
| Deliveries: Test Articles: Test Article Deliveries (9) | 1 | 2020 | 1 | 2020 |
| Deliveries: Test Articles: Test Article Deliveries (10) | 1 | 2021 | 1 | 2021 |
| Deliveries: Test Articles: Test Article Deliveries (11) | 1 | 2022 | 1 | 2022 |
| Deliveries: Test Articles: Test Article Deliveries (12) | 1 | 2023 | 1 | 2023 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603261N *I Tactical Airborne Reconnaissance* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 72.951 | 3.265 | 3.707 | 3.540 | - | 3.540 | 3.522 | 3.593 | 3.662 | 3.735 | Continuing | Continuing |
| 2467: *UxS Common Standards, Interoperability and Integration* | 72.951 | 3.265 | 3.707 | 3.540 | - | 3.540 | 3.522 | 3.593 | 3.662 | 3.735 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

This program element funds efforts to develop common technical and interoperability standards for current and future unmanned sensors, communications, and networking capabilities to achieve the required integration and interoperability of Unmanned Systems(UxS)represented in approved Naval Concept of Operations (CONOPS).

This program is funded under ADVANCED COMPONENT DEVELOPMENT AND PROTOTYPES because it includes all efforts necessary to evaluate integrated technologies, representative models or prototype systems in a high fidelity and realistic operating environment.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 3.274 | 3.707 | 3.635 | - | 3.635 |
| Current President's Budget | 3.265 | 3.707 | 3.540 | - | 3.540 |
| Total Adjustments | -0.009 | 0.000 | -0.095 | - | -0.095 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -0.003 | 0.000 | | | |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -0.095 | - | -0.095 |
| • Congressional General Reductions Adjustments | -0.006 | - | - | - | - |

**Change Summary Explanation**

Technical: Not applicable to baseline.
Schedule: Not applicable.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603261N / *Tactical Airborne Reconnaissance* | Project (Number/Name)<br>2467 / *UxS Common Standards, Interoperability and Integration* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2467: *UxS Common Standards, Interoperability and Integration* | 72.951 | 3.265 | 3.707 | 3.540 | - | 3.540 | 3.522 | 3.593 | 3.662 | 3.735 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The Naval Unmanned Aircraft Systems (UAS) strategy employs a family of UAS to perform persistent Intelligence, Surveillance, and Reconnaissance (ISR) in support of naval and joint service missions from forward bases/platforms and naval ships.

In support of the Navy and Marine Corps' overall UAS strategy, this program develops common technical and interoperability standards for current and future unmanned sensors, communications, and networking capabilities to achieve the integration and interoperability of UAS systems represented in approved Naval Concept of Operations (CONOPS). Leveraging fleet input based on current operations and informed by future operational plans, these efforts ensure the desired interoperability and integration of Unmanned Systems (UxS) throughout the battlespace is achieved. This program also establishes the common architecture, including command & control, for all unmanned systems to support and inform future CONOPS development. This effort provides for a cross program view of naval unmanned systems and is the entry point for DoN and other services to address commonality and interoperability opportunities.

Specifically:
- Provides studies and demonstrations in support of naval UAS Family of Systems (FoS) CONOPS development.
- Horizontally integrates across the naval UAS FoS through the development of Naval Interoperability Profiles to achieve required unmanned capabilities and interoperability.
- Provides support for development of common and interoperable UAS standards for use throughout the Department of Defense (DoD) and the North Atlantic Treaty Organization (NATO).
- Conducts CONOPS studies, demonstrations, advanced development/prototyping, and exercises for vehicle control, targeting, and weapons, sensor and payload employment.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Studies and Demonstrations | 1.656 | 1.760 | 1.920 | 0.000 | 1.920 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Studies and demonstrations to support CONOPS development from an interoperability perspective for effective integration of UAS. Develop a UAS architecture environment to allow for effective modeling and simulation of common UAS components in representative battlespace architectures. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603261N / *Tactical Airborne Reconnaissance* | **Project (Number/Name)**<br>2467 / *UxS Common Standards, Interoperability and Integration* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***FY 2018 Plans:***<br>Continue development of the UAS technical standards to include associated modeling and simulation across Fleet CONOPS scenarios. Demonstrate and validate manned/unmanned interoperability. Provide government engineering support, program office travel, and contract support services.<br>***FY 2019 Base Plans:***<br>Continue development of the Unmanned Aircraft Systems (UAS) modeling and simulation of Fleet CONOPS scenarios. Demonstrate Manned/Unmanned Interoperability. Provide government engineering support, program office travel, and contract support services.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>There is no significant difference between FY 2018 and FY 2019. | | | | | |
| ***Title:*** Naval Interoperability & Standardization | 1.609 | 1.947 | 1.620 | 0.000 | 1.620 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Develop UAS common technical standards implementations to achieve desired capabilities and interoperability between manned/unmanned systems.<br>***FY 2018 Plans:***<br>Continue to develop Unmanned Systems Naval Interoperability Profiles in support of approved naval CONOPS. Support Office of the Secretary of Defense Joint Service and NATO coalition interoperability efforts. Provide government engineering support, program office travel, and contract support services.<br>***FY 2019 Base Plans:***<br>Continue to develop Unmanned Systems Naval Interoperability Profiles in support of approved naval CONOPS. Support DoN, Joint Service and NATO coalition interoperability efforts. Provide government engineering support, program office travel, and contract support services.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603261N / *Tactical Airborne Reconnaissance* | **Project (Number/Name)**<br>2467 / *UxS Common Standards, Interoperability and Integration* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| There is no significant difference between FY 2018 and FY 2019. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 3.265 | 3.707 | 3.540 | 0.000 | 3.540 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The department will leverage existing government facilities and resources to develop common technical and interoperability standards for current and future unmanned sensors, communications, and networking capabilities to achieve the required interoperability and integration of unmanned systems represented in approved Naval Concept of Operations (CONOPS). Government engineering support will be used for standards development, architectural analysis, modeling and simulation efforts and testing.

**E. Performance Metrics**

UAS capabilities delivered to the warfighter are continually improved upon through efforts that increase the level of commonality, standardization, and interoperability between nodes depicted in existing and planned Naval CONOPS.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603261N / *Tactical Airborne Reconnaissance* | Project (Number/Name)<br>2467 / *UxS Common Standards, Interoperability and Integration* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Prior year Prod Dev no longer funded in the FYDP | Various | Various : Various | 18.711 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 18.711 | - |
| | | **Subtotal** | 18.711 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 18.711 | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Software Development | WR | NAWCWD : China Lake, CA | 0.520 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.520 | - |
| Studies & Demonstrations | WR | NAWCAD : Pax River, MD | 4.685 | 0.227 | Dec 2016 | 0.241 | Dec 2017 | 0.245 | Dec 2018 | - | | 0.245 | Continuing | Continuing | Continuing |
| Standards Development | C/CPFF | Engility : Lexington Park, MD | 1.376 | 1.404 | Jan 2017 | 1.432 | Jan 2018 | 1.400 | Jan 2019 | - | | 1.400 | Continuing | Continuing | Continuing |
| Prior year Support no longer funded in the FYDP | Various | Various : Various | 29.295 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 29.295 | - |
| | | **Subtotal** | 35.876 | 1.631 | | 1.673 | | 1.645 | | - | | 1.645 | Continuing | Continuing | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Prior year Test & Eval no longer funded in the FYDP | Various | Various : Various | 2.627 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.627 | - |
| | | **Subtotal** | 2.627 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.627 | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603261N / *Tactical Airborne Reconnaissance* | Project (Number/Name)<br>2467 / *UxS Common Standards, Interoperability and Integration* | |

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management Support | Various | Various : Various | 4.377 | 0.203 | Jan 2017 | 0.207 | Jan 2018 | 0.218 | Jan 2019 | - | | 0.218 | Continuing | Continuing | Continuing |
| Government Engineering Support | WR | NAWCAD : Pax River, MD | 9.754 | 1.429 | Dec 2016 | 1.825 | Dec 2017 | 1.675 | Dec 2018 | - | | 1.675 | Continuing | Continuing | Continuing |
| Travel | WR | NAVAIR HQ : Pax River, MD | 0.556 | 0.002 | Oct 2016 | 0.002 | Oct 2017 | 0.002 | Oct 2018 | - | | 0.002 | Continuing | Continuing | Continuing |
| Prior year Mgmt Services no longer funded in the FYDP | Various | Various : Various | 1.050 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.050 | - |
| | | **Subtotal** | 15.737 | 1.634 | | 2.034 | | 1.895 | | - | | 1.895 | Continuing | Continuing | N/A |

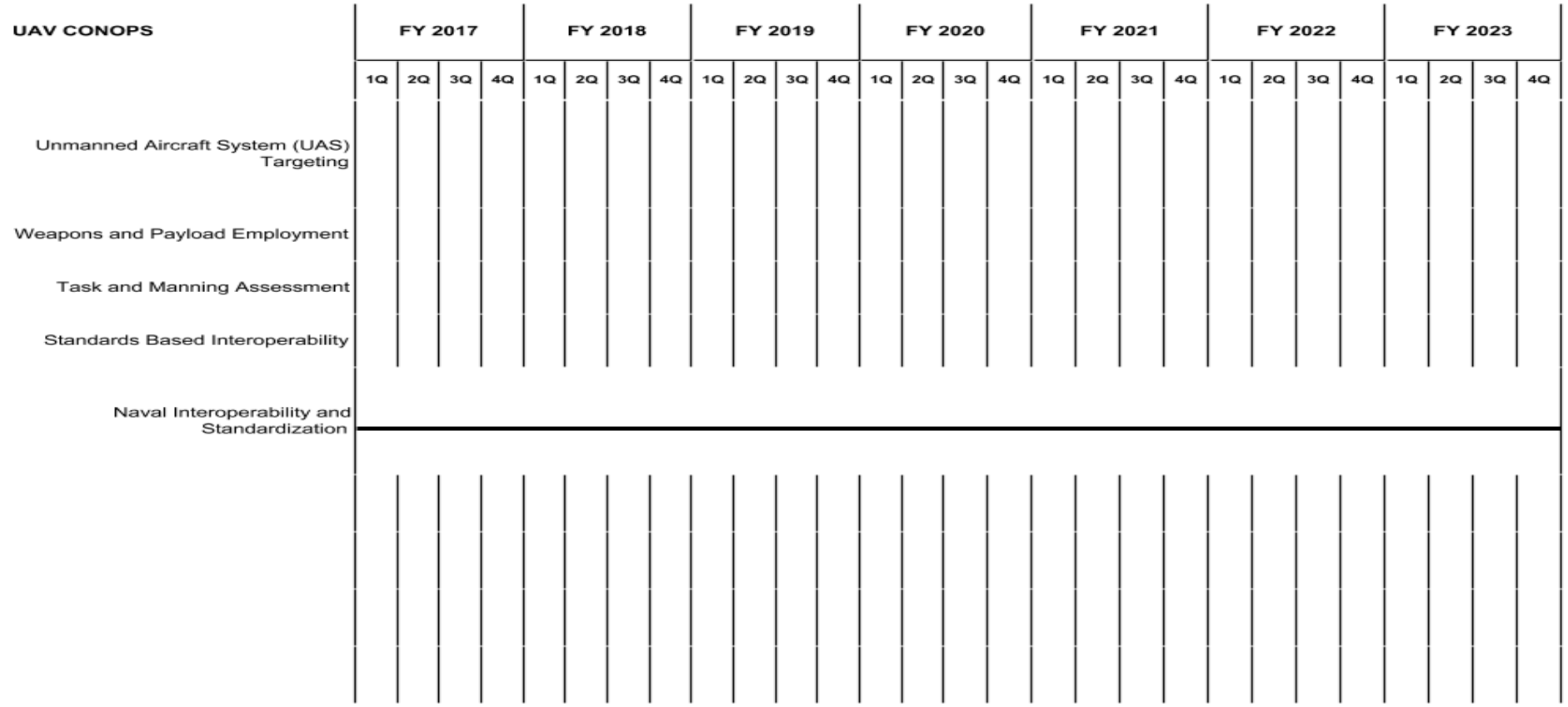
**Remarks**

Travel contract type is TO.

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 72.951 | 3.265 | | 3.707 | | 3.540 | | - | | 3.540 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603261N / *Tactical Airborne Reconnaissance* | **Project (Number/Name)**<br>2467 / *UxS Common Standards, Interoperability and Integration* |




*2019DON - 0603261N - 2467*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603261N / *Tactical Airborne Reconnaissance* | **Project (Number/Name)**<br>2467 / *UxS Common Standards, Interoperability and Integration* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***UxS Common Standards, Interoperability and Integration*** | | | | |
| Naval Interoperability and Standardization: | 1 | 2017 | 4 | 2023 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603382N *I Advanced Combat Systems Tech* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 67.237 | 3.583 | 61.381 | 59.741 | - | 59.741 | 67.098 | 75.244 | 46.307 | 50.826 | Continuing | Continuing |
| 0324: *Adv Combat System Technology* | 67.237 | 1.583 | 1.869 | 1.813 | - | 1.813 | 1.797 | 1.835 | 1.875 | 1.912 | Continuing | Continuing |
| 0385: *Rapid Prototype Development* | 0.000 | 1.000 | 25.876 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 26.876 |
| 0399: *Unmanned Rapid Prototype Development* | 0.000 | 1.000 | 15.361 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 16.361 |
| 3422: *SHARC Surface Platform* | 0.000 | 0.000 | 6.775 | 9.935 | - | 9.935 | 11.445 | 13.459 | 2.968 | 0.000 | 0.000 | 44.582 |
| 3423: *LOCUST* | 0.000 | 0.000 | 3.500 | 3.454 | - | 3.454 | 2.960 | 5.948 | 7.940 | 8.103 | Continuing | Continuing |
| 3424: *Heterogeneous Collaborative Unmanned Systems (HCUS)* | 0.000 | 0.000 | 8.000 | 7.896 | - | 7.896 | 3.922 | 0.000 | 0.000 | 0.000 | 0.000 | 19.818 |
| 3437: *EMW/SEWIP/SSEE Accelerator* | 0.000 | 0.000 | 0.000 | 21.584 | - | 21.584 | 23.771 | 23.773 | 0.000 | 0.000 | 0.000 | 69.128 |
| 3438: *Innovative Naval Prototype (INP) Transition (6.4)* | 0.000 | 0.000 | 0.000 | 15.059 | - | 15.059 | 23.203 | 30.229 | 33.524 | 40.811 | Continuing | Continuing |

**Note**

Plans and associated resources in Program Element (PE) 0603382N ADVANCED COMBAT SYSTEMS TECH, Project Unit (PU) 0385 Rapid Prototype Development, and PU 0399 Unmanned Rapid Prototype Development are realigned effective FY2019 to PE 0604030N Rapid Prototyping, Experimentation and Demonstration, PU 0385 Rapid Prototype Development.

**A. Mission Description and Budget Item Justification**

The Advanced Combat System Technology line is to evolve the technical and business practices for programs to change to an open architecture construct. The program was constructed to mature both technical and business model integration for C5I systems programs of record in an open architecture environment. The priority was incorporating the principles of modular design and design disclosure, reusable application software, interoperability and secure information exchange, lifecycle affordability and encouraging competition and collaboration.

Project Unit 0324: Funding is to fully implement the Naval Open (Systems) Architecture (OSA) strategy. The implementation of this strategy provides the tools and leadership for assisting programs and the Naval Research and Development Establishment through the technical, business and cultural transition to OSA. The primary tools and assistance is established through a limited set of technical reference frameworks, consistent contract language guidance, Intellectual Property strategies and

improvements in transparency of design disclosure and information exchange on past and current investments to support portfolio management and cross-program reuse. The OSA transformation effort will be applied to programs of record and coupled with rapid prototyping efforts being realized as management efficiencies both within programs and in accelerated acquisition efforts. Those elements include ensuring that all naval systems, families of systems, programs and prototypes move to modular OSA in accordance with Department of Defense (DoD) Instruction 5000.01 of 7 January 2015 which mandates that all DoD programs utilize Modular OSA to rapidly field affordable and interoperable systems. This project facilitates a strategic shift in the technical and business methods to establish cooperation and cross-domain/COI business relationships. This improves innovation and economies of scale throughout the Navy and Marine Corps. This leadership effort has identified the business case and potential return on investment for moving the Navy towards an open systems approach, supported the development of open systems technologies, and integrated best business and technical practices for open systems development within Naval acquisition. Naval OSA ensures Navy-wide system architectures become extensible and scalable in function, capacity, and workload to meet Joint warfighting requirements. This also includes the identification and development of common software components, functions, reuse methodologies, and extensible product lines.

Project Unit 0385: The Rapid Prototype Development project funds a strategic focus on rapid prototyping of innovative combat system technologies and engineering innovations to explore Fleet-proposed capability concepts and needs, as well as foster advancements in naval warfighting capabilities. With an emphasis on rapidly prototyping mature technologies, the project is intended to expedite the development, exploration and fielding of technology and engineering prototypes to provide advanced warfighting capabilities, new technologies and engineering innovations across all Naval warfighting domains. Concepts and enabling technologies include but are not limited to: directed energy weapons, hypersonics, unmanned systems, artificial intelligence, machine learning, and multi-domain operations.

Project Unit 0399: Funding realigned to the Rapid Prototype Development project (Project Number 0385) in FY 2019.

Project Unit 3422: The SHARC Surface Platforms demonstration project is part of the Department of Defense Third Offset Strategy as one element in the Sensor Grid category for 24/7 autonomy infused Situational Awareness (SA). This project will purchase Commercial-off-the-Shelf SHARC Platforms (wave gliders) and integrate four (4) unique Government-owned classified mission payloads focused on the detection of threats. These capabilities will enable CONOPS development in an operationally relevant environment to demonstrate how these technologies can improve the SA to the battlespace Commanders.

Project Unit 3423: The LOCUST demonstration is part of the Department of Defense Third Offset Strategy as one element in the Effector Grid category for small autonomous systems. LOCUST leverages the BA-3 Innovative Naval Prototype program developing and demonstrating swarming technology. The BA-3 effort is developing both the air vehicle, UAS swarming behaviors, and miniaturized sensor systems. ONR has demonstrated an autonomous system capable of launching 33 UASs in 40 seconds and flying them in a coordinated swarm. This BA-4 effort is trailing the BA-3 demonstration of technologies by a fiscal quarter and then demonstrating the technology in operationally relevant environments with military mission applications.

Project Unit 3424: The Heterogeneous Collaborative Unmanned Systems (HCUS) demonstration is part of the Department of Defense Third Offset Strategy as one element in the Effector Grid category for small autonomous systems. HCUS provides autonomous, tactical monitoring of an adversary's port-sized littoral area for an extended period of time with capability to apply limited offensive effects on-demand. Vehicles and sensors are intended to be used in contested environments - employing local communications nets, autonomous vehicle behavior, low bandwidth command links and local navigation with no requirement for GPS input.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603382N *I Advanced Combat Systems Tech* |

HCUS systems can be encapsulated and deployed as a single payload, or a small number of payload packages designed for specific missions. The payloads can be carried into theater by various manned or unmanned platforms depending on the degree of stealth required. A week-long project demonstration will simulate covert deployment, operations of autonomous UAVs over the area of interest, data exfiltration to a remote operator, autonomous UAV recharging via USVs and/or UUVs, deployment of unmanned ground sensors for persistent sensing, and remote operator on-demand offensive attack on a simulated target.

Project 3438: This activity addresses the advanced component development and prototype demonstration associated with ONR's Innovative Naval Prototypes (INP) Program and the Leap Ahead Technology (LA-Tech) investments. INP and LA-Tech investments represent game changing technologies with the potential to revolutionize operational concepts. They are disruptive in nature as they would dramatically change the way naval forces fight. INPs and LA-Techs push the imagination of our nation's technical talent to deliver transformational warfighting capabilities. Investments may include such mission areas as Unmanned and Autonomous Systems, Directed Energy / Electric Weapons, Electromagnetic Maneuver Warfare, Cyber Warfare, and Undersea Warfare. Funding to be realigned from the Unmanned Rapid Prototype Development project (Project Number 0399) in FY 2019.

Project 3437: The EMW/SEWIP/SSEE Accelerator is part of the Department of Defense Third Offset Strategy to improve real time Electro-Magnetic Maneuver Warfare operations. This effort will develop integrated cross platform active and passive sensing solutions, next generation network and real time spectrum operations.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 57.034 | 61.381 | 65.946 | - | 65.946 |
| Current President's Budget | 3.583 | 61.381 | 59.741 | - | 59.741 |
| Total Adjustments | -53.451 | 0.000 | -6.205 | - | -6.205 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -0.063 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | 22.000 | - | 22.000 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -28.205 | - | -28.205 |
| • Congressional General Reductions Adjustments | -0.005 | - | - | - | - |
| • Congressional Directed Reductions Adjustments | -53.383 | - | - | - | - |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603382N / *Advanced Combat Systems Tech* | Project (Number/Name)<br>0324 / *Adv Combat System Technology* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0324: *Adv Combat System Technology* | 67.237 | 1.583 | 1.869 | 1.813 | - | 1.813 | 1.797 | 1.835 | 1.875 | 1.912 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Project Unit 0324: Funding is to fully implement the Naval Open (Systems) Architecture (OSA) strategy. The implementation of this strategy provides the tools and leadership for assisting programs and the Naval Research and Development Establishment (NR&DE) through technical, business and policy transition to OSA. The primary tools and assistance are provided through a limited set of technical reference frameworks, consistent contract language guidance, Intellectual Property strategies and improvements in transparency of design disclosure and information exchange on past and current investments to support portfolio management and cross-program reuse. The OSA transformation effort will be applied to programs of record and coupled with rapid prototyping efforts being realized as management efficiencies both within programs and in accelerated acquisition efforts. Those elements include ensuring that all naval systems, families of systems, programs and prototypes move to modular OSA in accordance with Department of Defense (DoD) Instruction 5000.01 of 7 January 2015 which mandates that all DoD programs utilize Modular Open Systems Architecture to rapidly field affordable and interoperable systems. This project facilitates a strategic shift in the technical and business methods to establish cooperation, cross-domain, and community of interest business relationships. This improves innovation and economies of scale throughout the Navy and Marine Corps. This leadership effort has identified the business case and potential return on investment for moving the Navy towards an open systems approach, supported the development of open systems technologies, and integrated best business and technical practices for open systems development within Naval acquisition. Naval OSA ensures Navy-wide system architectures become extensible and scalable in function, capacity, and workload to meet Joint warfighting requirements. This also includes the identification and development of common software components, functions, reuse methodologies, and extensible product lines.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Align the Naval Enterprise Across All Domains to Implement OA | 0.988 | 0.631 | 0.562 | 0.000 | 0.562 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Coordinate the development of hardware and software in using Technical Reference Frameworks for common products that could be employed across a variety of platforms. | | | | | |
| ***FY 2019 Base Plans:***<br>The FY 2019 budget plan is to continue to execute the FY2018 plan in addition to support program Modular Open Architecture development in coordination with accelerated acquisition projects and POR and define where Modular Open Systems Architecture is needed based on technology growth areas and Threats. | | | | | |
| ***FY 2019 OCO Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>0324 / *Adv Combat System Technology* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>There is no significant difference between FY18 and FY19. | | | | | |
| ***Title:*** Change the Naval and Marine Corps policy and guidance to Institutionalize OA Principle<br>***Articles:***<br><br>***FY 2018 Plans:***<br>Coordinate the development of hardware and software in using Technical Reference Frameworks for common products that could be employed across a variety of platforms.<br><br>***FY 2019 Base Plans:***<br>The FY 2019 budget will be utilized to continue to execute the FY2018 plan in addition to support the initiation of Modular Open Systems Architecture for rapid prototyping projects to be incorporated in conjunction with platform system block upgrades and promote policy changes that support the implementation and standardization of Modular Open Systems Architecture for POR interoperability efforts.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>These are Economic Adjustments due to inflation from FY2018 to FY2019. | 0.208<br>- | 0.624<br>- | 0.619<br>- | 0.000<br>- | 0.619<br>- |
| ***Title:*** OA Systems Engineering Leadership<br>***Articles:***<br><br>***FY 2018 Plans:***<br>Continue FY2017 Plan in addition to:<br>Sponsor Communities of Interest to support cooperation between programs<br><br>***FY 2019 Base Plans:***<br>The FY 2019 budget will be utilized to continue to execute the FY2018 plan in addition to coordinate the development and maintenance of Modular Open Systems Architecture interfaces and standards, promote projects that have successfully implemented OA in its systems, and to delegate authority as appropriate to enable speed and agility.<br><br>***FY 2019 OCO Plans:*** | 0.159<br>- | 0.225<br>- | 0.232<br>- | 0.000<br>- | 0.232<br>- |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>0324 / *Adv Combat System Technology* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>There is no significant difference between FY18 and FY19 | | | | | |
| ***Title:*** Knowledge Products for Implementing OSA | 0.228 | 0.389 | 0.400 | 0.000 | 0.400 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Continue with FY2017 Plan in addition to:<br>Work with the Naval Laboratories to establish OSA as the default method for creating prototypes<br>***FY 2019 Base Plans:***<br>The FY 2019 budget will continue to execute the FY2018 plan and to provide Scientists and Engineers within NR&DE common products that can be used across the enterprise and identify test assets that can be leveraged between programs to implement OSA and accelerate acquisition.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>These are Economic Adjustments due to inflation from FY2018 to FY2019. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 1.583 | 1.869 | 1.813 | 0.000 | 1.813 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

This has been a Navy Acquisition Executive directed effort to fundamentally alter the business, technical and policy for warfare systems acquisition to result in improved cost, increased access to innovation, a reduction in time to field, and promote cultural environment change. The Navy's OSA Enterprise effort built off past successes such as the Acoustic Rapid Commercial-off-the-Shelf Insertion started program and established this core OA Budget line (policy statement dated 5 August 2004). The strategy was further refined in the Deputy Chief of Naval Operations (DCNO)requirement of 23 December 2005 (N6/7), the Naval OSA Strategy of 2011 and extended for applicability to the other Defense Services under the DoD Better Buying Power initiative. This effort continues to expand into and support the related strategic shift to Rapid Prototyping, Experimentation and Demonstration.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>0324 / *Adv Combat System Technology* |

**E. Performance Metrics**

Change Naval Processes and business practices to cost-effectively innovate and rapidly deploy improved warfighting capability based on fleet requirements. Provide OSA to field common, interoperable capabilities; Change Navy and Marine Corps Business processes to Institutionalize OSA Principles.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603382N / *Advanced Combat Systems Tech* | Project (Number/Name)<br>0324 / *Adv Combat System Technology* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SE/OA Domain Support | C/FP | APL/ IET Contract : VARIOUS | 2.576 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.576 | Continuing |
| Systems Engineering | MIPR | NSWC / Dahlgren : Dahlgren, VA | 13.307 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 13.307 | Continuing |
| Systems Engineering | WR | NSWC/CRANE, Carderock, DISA : VARIOUS | 3.119 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.119 | Continuing |
| Systems Engineering | C/CPAF | ASSETT; Lockheed Martin, NJ; Gartner, VA : Washington DC | 5.114 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 5.114 | Continuing |
| OA DOMAIN SUPPORT | WR | NUWC/Newport, Spawar, Navair : VARIOUS | 11.931 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 11.931 | Continuing |
| SE/Signal Processor | C/CPAF | Lockheed Martin : VARIOUS | 6.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 6.000 | Continuing |
| SE/Signal Processor | C/CPAF | BAE : VARIOUS | 0.300 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.300 | Continuing |
| SE/Signal Processor | C/CPAF | Raytheon : VARIOUS | 0.100 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.100 | Continuing |
| SE/Signal Processor | WR | NSWC/DD, NRL, PHD : VARIOUS | 0.600 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.600 | Continuing |
| Align the Naval Enterprise Across All Domains to Implement OA | WR | NSWCDD : VARIOUS | 1.000 | 0.988 | Mar 2017 | 0.631 | Oct 2017 | 0.562 | Oct 2018 | - | | 0.562 | 0.000 | 3.181 | - |
| Change the Naval and Marine Corps policy and guidance to Institutionalize OA Principle | WR | NSWC, NRL, NUWC, NAWC : VARIOUS | 0.192 | 0.208 | Jul 2017 | 0.624 | Oct 2017 | 0.619 | Oct 2018 | - | | 0.619 | 0.000 | 1.643 | - |
| OA Systems Engineering Leadership | WR | NSWC, NRL, NUWC, NAWC : VARIOUS | 0.161 | 0.159 | Jul 2017 | 0.225 | Oct 2017 | 0.232 | Oct 2018 | - | | 0.232 | 0.000 | 0.777 | - |
| Knowledge Products for Implementing OSA | WR | NSWC, NRL, NUWC, NAWC NUW, NEWPORT, | 0.219 | 0.228 | Jul 2017 | 0.389 | Oct 2017 | 0.400 | Oct 2018 | - | | 0.400 | 0.000 | 1.236 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603382N / *Advanced Combat Systems Tech* | Project (Number/Name)<br>0324 / *Adv Combat System Technology* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NSWC CRANE : VARIOUS | | | | | | | | | | | | | |
| | | **Subtotal** | 44.619 | 1.583 | | 1.869 | | 1.813 | | - | | 1.813 | 0.000 | 49.884 | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Industry Development | C/FP | IBM, ANGLE, TBD (New IET Contract) : VARIOUS | 9.805 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 9.805 | Continuing |
| Technical Data-Academia | WR | NPS-Monterey/DAU : MONTEREY, CA | 2.348 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.348 | Continuing |
| Software Development | C/FP | TRIDENT, ASSET : VARIOUS | 0.309 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.309 | Continuing |
| | | **Subtotal** | 12.462 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 12.462 | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Operational Test & Evaluation | WR | NSWC/DD : DAHLGREN, VA | 2.216 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.216 | Continuing |
| OA Asset Repository (SBIR Account) | WR | Miscellaneous : VARIOUS | 0.150 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.150 | Continuing |
| | | **Subtotal** | 2.366 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.366 | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>0324 / *Adv Combat System Technology* |

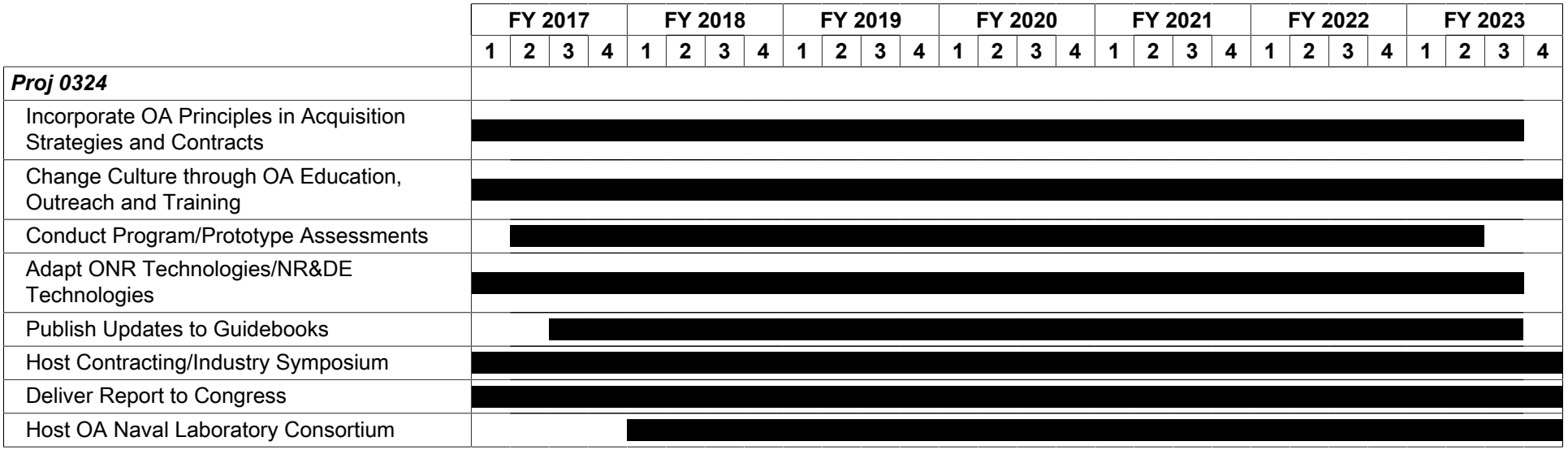
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management Support | C/CPAF | Miscellaneous : VARIOUS | 3.021 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| SBIR Assessment (Cong Add) | WR | NSWC/DD : DAHLGREN, VA | 4.748 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 4.748 | Continuing |
| DAWDF | TBD | TBD : TBD | 0.021 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.021 | Continuing |
| | | **Subtotal** | 7.790 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 67.237 | 1.583 | | 1.869 | | 1.813 | | - | | 1.813 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>0324 / *Adv Combat System Technology* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>0324 / *Adv Combat System Technology* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 0324*** | | | | |
| Incorporate OA Principles in Acquisition Strategies and Contracts | 1 | 2017 | 3 | 2023 |
| Change Culture through OA Education, Outreach and Training | 1 | 2017 | 4 | 2023 |
| Conduct Program/Prototype Assessments | 2 | 2017 | 2 | 2023 |
| Adapt ONR Technologies/NR&DE Technologies | 1 | 2017 | 3 | 2023 |
| Publish Updates to Guidebooks | 3 | 2017 | 3 | 2023 |
| Host Contracting/Industry Symposium | 1 | 2017 | 4 | 2023 |
| Deliver Report to Congress | 1 | 2017 | 4 | 2023 |
| Host OA Naval Laboratory Consortium | 1 | 2018 | 4 | 2023 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603382N / *Advanced Combat Systems Tech* | Project (Number/Name)<br>0385 / *Rapid Prototype Development* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0385: *Rapid Prototype Development* | 0.000 | 1.000 | 25.876 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 26.876 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

The funding decrease from FY2018 to FY2019 reflects the realignment of requirements and associated resources from Program Element (PE) 0603382N ADVANCED COMBAT SYSTEMS TECH, Project Unit (PU) 0385 Rapid Prototype Development to PE 0604030N Rapid Prototyping, Experimentation and Demonstration, PU 0385 Rapid Prototype Development.

**A. Mission Description and Budget Item Justification**

Department of Navy (DON) leadership has acknowledged that maintaining maritime superiority depends in part on our ability to accelerate the speed of warfighting and technological innovations in order to extend our advantage to offset our adversaries' growing capabilities. It is fundamental to the DON's efforts to improve our acquisition outcomes. This project is aligned with, and in direct response to, calls for increased prototyping and experimentation in USD(AT&L)'s Better Buying Power 3.0, Secretary of the Navy's (SECNAV) Task Force Innovation direction, and the CNO direction to achieve High Velocity Learning at Every Level. These efforts will reinvigorate and increase the use of prototyping to rapidly field new warfighting capabilities, concepts and technologies, and engineering solutions.

The Rapid Prototype Development project funds a strategic focus on rapid prototyping of innovative combat system technologies and engineering innovations to explore Fleet-proposed capability concepts and needs, as well as foster advancements in naval warfighting capabilities. With an emphasis on rapidly prototyping mature technologies, the project is intended to expedite the development, exploration and fielding of technology and engineering prototypes to provide advanced warfighting capabilities, new technologies and engineering innovations across all Naval warfighting domains. Concepts and enabling technologies include but are not limited to; directed energy weapons, hypersonics, unmanned systems, artificial intelligence, machine learning, and multi-domain operations.

Specific projects under this project number will be selected and executed in accordance with the Department of the Navy (DoN) Accelerated Acquisition Process as described in SECNAVINST 5000.42. The Secretary of the Navy will notify Congress prior to initiation of a project under this project number in accordance with the requirements established in Section 216 of the FY 2017 National Defense Authorization Act.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Rapid Prototype Development, Experimentation and Demonstration | 1.000 | 25.876 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>0385 / *Rapid Prototype Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Project 0385 funding supports the SURTASS-E Rapid Prototyping, Experimentation and Demonstration (RPED) project which will provide a modular, flexible, and rapidly deployable mobile acoustic wide-area surveillance capability for installation aboard a vessel of opportunity (VOO). The project will deliver and demonstrate one system consisting of International Organization for Standardization containerized mission system ship set, installed on a VOO. Specific FY18 activities include: design and development of the SURTASS-E winch and handling system; procurement of long lead sub-systems for the command, control, communications, computers and intelligence (C4I) van; mission system hardware and software development and integration; VOO assessment, leasing and platform evaluation; VOO installation hardware; towed array towing hardware; acoustic processing development; and system level ship integration and performance assessment .<br><br>Project 0385 will support additional emergent FY2018 RPED initiatives, as designated by the Accelerated Acquisition Board of Directors (AABoD) in accordance with SECNAVINST 5000.42 to expedite the development, exploration and fielding of technology and engineering prototypes to provide advanced warfighting capabilities, new technologies and engineering innovations across all Naval warfighting domains.<br><br>***FY 2019 Base Plans:***<br>N/A<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>The funding decrease from FY2018 to FY2019 reflects the realignment of requirements and associated resources from Program Element (PE) 0603382N ADVANCED COMBAT SYSTEMS TECH, Project Unit (PU) 0385 Rapid Prototype Development to PE 0604030N Rapid Prototyping, Experimentation and Demonstration, PU 0399 0385 Rapid Prototype Development. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 1.000 | 25.876 | 0.000 | 0.000 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>0385 / *Rapid Prototype Development* |

**D. Acquisition Strategy**

Projects identified for execution under this project number are non-acquisition programs. Each project will develop a project plan to support project execution. Project plans will include a project schedule and technical requirements and objectives to measure project performance. The selected technical solutions will be demonstrated in operationally relevant environments to assess their ability to meet warfighter requirements. Project deliverables include actual integrated hardware/software prototype systems, CONOPS, requirements, test reports, technical data, and associated doctrine, organization, training, leadership and education, and personnel aspects necessary to support decision making. These deliverables will be used to support project disposition decisions to include transition of technologies to acquisition, further refinement of the technology, or termination and reinvestment of remaining funds to other technologies that add military value.

**E. Performance Metrics**

Performance metrics are specific to each of the projects funded. All will include measures identified in the Statement of Objectives (SOO), including completions, successes, terminations, and iterative prototype cycle times reported against schedules and deliverables stated in the requirement documents.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>0385 / *Rapid Prototype Development* |

**Product Development ($ in Millions)**

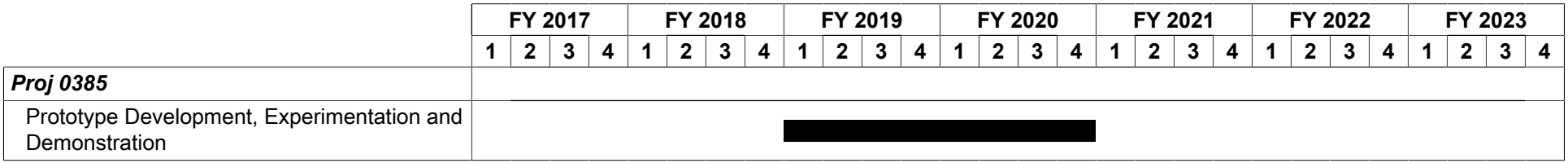
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mission System HW/SW | SS/CPFF | John Hopkins : Maryland | 0.000 | 0.000 | | 7.700 | Mar 2018 | 0.000 | | - | | 0.000 | 7.700 | 15.400 | - |
| VOO Evaluation | WR | Military Sealift Command : Norfolk, Va | 0.000 | 0.000 | | 3.300 | Mar 2018 | 0.000 | | - | | 0.000 | 3.300 | 6.600 | - |
| Winch Design and Procurement | WR | NAVFAC : California | 0.000 | 0.000 | | 3.300 | Mar 2018 | 0.000 | | - | | 0.000 | 3.300 | 6.600 | - |
| Towed Army Test Equip and VOO Assessment | WR | NSWC : Carderock, Md | 0.000 | 0.000 | | 0.700 | Mar 2018 | 0.000 | | - | | 0.000 | 0.700 | 1.400 | - |
| C41 Suite Development and Integration | WR | NAWC : Panama City, Fl | 0.000 | 0.000 | | 3.600 | Mar 2018 | 0.000 | | - | | 0.000 | 3.600 | 7.200 | - |
| Prototype Development, Experimentation and Demonstration | Various | Va : TBD | 0.000 | 1.000 | Nov 2017 | 0.000 | Mar 2018 | 0.000 | | - | | 0.000 | 0.000 | 1.000 | - |
| VOO Installation Hardware | C/CPFF | Oceaneering Intl : San Diego, Ca | 0.000 | 0.000 | | 0.400 | Mar 2018 | 0.000 | | - | | 0.000 | 0.400 | 0.800 | - |
| Common Support Modules Dev Integration | MIPR | PMS 420 : Washington, DC | 0.000 | 0.000 | | 4.100 | Jun 2018 | 0.000 | | - | | 0.000 | 5.000 | 9.100 | - |
| Towed System Shore Support | WR | SSC Lant : Little Creek, Va | 0.000 | 0.000 | | 1.000 | Mar 2018 | 0.000 | | - | | 0.000 | 1.000 | 2.000 | - |
| Prototype Dev, Experiemt & Demonstration | Various | Various : Various | 0.000 | 0.000 | | 1.776 | Mar 2018 | 0.000 | | - | | 0.000 | 0.000 | 1.776 | - |
| | | **Subtotal** | 0.000 | 1.000 | | 25.876 | | 0.000 | | - | | 0.000 | 25.000 | 51.876 | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 1.000 | | 25.876 | | 0.000 | | - | | 0.000 | 25.000 | 51.876 | N/A |

**Remarks**

Support and Test and Evaluation costs are directly associated with the delivery of the primary product and included in the product development cost category for rapid prototype development, experimentation and demonstration cost categories.

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>0385 / *Rapid Prototype Development* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>0385 / *Rapid Prototype Development* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 0385*** | | | | |
| Prototype Development, Experimentation and Demonstration | 1 | 2019 | 4 | 2020 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603382N / *Advanced Combat Systems Tech* | Project (Number/Name)<br>0399 / *Unmanned Rapid Prototype Development* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0399: *Unmanned Rapid Prototype Development* | 0.000 | 1.000 | 15.361 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 16.361 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

The funding decrease from FY2018 to FY2019 reflects the realignment of requirements and associated resources from Program Element (PE) 0603382N ADVANCED COMBAT SYSTEMS TECH, Project Unit (PU) 0399 Unmanned Rapid Prototype Development to PE 0604030N Rapid Prototyping, Experimentation and Demonstration, PU 0385 Rapid Prototype Development.

**A. Mission Description and Budget Item Justification**

Department of Navy (DON) leadership has acknowledged that maintaining maritime superiority depends in part on our ability to accelerate the speed of warfighting and technological innovations in order to extend our advantage to offset our adversaries' growing capabilities. It is fundamental to the DON's efforts to improve our acquisition outcomes. This project is aligned with, and in direct response to, calls for increased prototyping and experimentation in USD(AT&L)'s Better Buying Power 3.0, Secretary of the Navy's (SECNAV) Task Force Innovation direction, and the CNO direction to achieve High Velocity Learning at Every Level. These efforts will reinvigorate and increase the use of prototyping to rapidly field new warfighting capabilities, concepts and technologies, and engineering solutions.

The Rapid Prototype Development project funds a strategic focus on rapid prototyping of innovative combat system technologies and engineering innovations to explore Fleet-proposed capability concepts and needs, as well as foster advancements in naval warfighting capabilities. With an emphasis on rapidly prototyping mature technologies, the project is intended to expedite the development, exploration and fielding of technology and engineering prototypes to provide advanced warfighting capabilities, new technologies and engineering innovations across all Naval warfighting domains. Concepts and enabling technologies include but are not limited to; directed energy weapons, hypersonics, unmanned systems, artificial intelligence, machine learning, and multi-domain operations.

Specific projects under this project number will be selected and executed in accordance with the Department of the Navy (DoN) Accelerated Acquisition Process as described in SECNAVINST 5000.42. The Secretary of the Navy will notify Congress prior to initiation of a project under this project number in accordance with the requirements established in Section 216 of the FY 2017 National Defense Authorization Act.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Unmanned Rapid Prototype Development, Experimentation and Demonstration | 1.000 | 15.361 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Department of Navy (DON) leadership has acknowledged that maintaining maritime superiority depends in part on our ability to accelerate the speed of warfighting and technological innovations in order to | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>0399 / *Unmanned Rapid Prototype Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|

extend our advantage to offset our adversaries' growing capabilities. It is fundamental to the DON's efforts to improve our acquisition outcomes. This project is aligned with, and in direct response to, calls for increased prototyping and experimentation in USD(AT&L)'s Better Buying Power 3.0, Secretary of the Navy's (SECNAV) Task Force Innovation direction, and the CNO direction to achieve High Velocity Learning at Every Level. These efforts will reinvigorate and increase the use of prototyping to rapidly field new warfighting capabilities, concepts and technologies, and engineering solutions.

The Unmanned Rapid Prototype Development project funds a strategic focus on rapid prototyping of innovative combat system technologies and engineering innovations to explore Fleet-proposed capability concepts and needs, as well as foster advancements in naval warfighting capabilities. With an emphasis on rapidly prototyping mature technologies, the project is intended to expedite the development, exploration and fielding of technology and engineering prototypes to provide advanced warfighting capabilities, new technologies and engineering innovations across all Naval warfighting domains.

Specific projects under this project number will be selected and executed in accordance with the Department of the Navy (DoN) Accelerated Acquisition Process as described in SECNAVINST 5000.42. The Secretary of the Navy will notify Congress prior to initiation of a project under this project number in accordance with the requirements established in Section 216 of the FY 2017 National Defense Authorization Act.

***FY 2018 Plans:***
Support FY2018 RPED initiatives, as designated by the AABoD, to expedite the development, exploration and fielding of technology and engineering prototypes to provide advanced warfighting capabilities, new technologies and engineering innovations across all Naval warfighting domains.

***FY 2019 Base Plans:***
Not applicable.

***FY 2019 OCO Plans:***
N/A

***FY 2018 to FY 2019 Increase/Decrease Statement:***
The funding decrease from FY2018 to FY2019 reflects the realignment of requirements and associated resources from Program Element (PE) 0603382N ADVANCED COMBAT SYSTEMS TECH, Project Unit (PU) 0399 Unmanned Rapid Prototype Development to PE 0604030N Rapid Prototyping, Experimentation and

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>0399 / *Unmanned Rapid Prototype Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Demonstration, PU 0385 Rapid Prototype Development. This realignment programmed to provide maximum funding flexibility for DoN Accelerated Acquisition Board of Directors (AABoD) designated Rapid Prototyping, Experimentation and Demonstration (RPED) projects. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 1.000 | 15.361 | 0.000 | 0.000 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Projects identified for execution under this project number are non-acquisition programs. Each project will develop a project plan to support project execution. Project plans will include a project schedule and technical requirements and objectives to measure project performance. The selected technical solutions will be demonstrated in operationally relevant environments to assess their ability to meet warfighter requirements. Project deliverables include actual integrated hardware/software prototype systems, CONOPS, requirements, test reports, technical data, and associated doctrine, organization, training, leadership and education, and personnel aspects necessary to support decision making. These decisions include the transition of technologies to acquisition, further refinement of the technology, or termination and reinvestment of remaining funds to other technologies that add military value.

**E. Performance Metrics**

Performance metrics are specific to each of the projects funded. All will include measures identified in the Statement of Objectives (SOO), including completions, successes, terminations, and iterative prototype cycle times reported against schedules and deliverables stated in the requirement documents.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>0399 / *Unmanned Rapid Prototype Development* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Prototype Development, Experiementation and Demonstration | Various | Various : Various | 0.000 | 1.000 | Jul 2017 | 15.361 | Mar 2018 | 0.000 | | - | | 0.000 | 0.000 | 16.361 | - |
| | | **Subtotal** | 0.000 | 1.000 | | 15.361 | | 0.000 | | - | | 0.000 | 0.000 | 16.361 | N/A |

**Remarks**

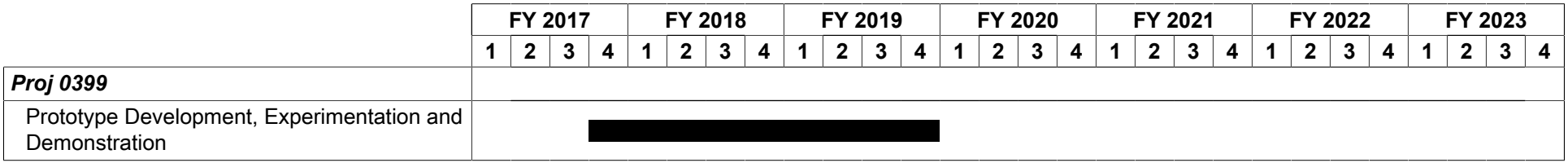
Support and Test and Evaluation costs are directly associated with the delivery of the primary product and included in the product development cost category for rapid prototype development, experimentation and demonstration cost categories.

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 1.000 | | 15.361 | | 0.000 | | - | | 0.000 | 0.000 | 16.361 | N/A |

**Remarks**

Support and Test and Evaluation costs are directly associated with the delivery of the primary product and included in the product development cost category for rapid prototype development, experimentation and demonstration cost categories.

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>0399 / *Unmanned Rapid Prototype Development* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>0399 / *Unmanned Rapid Prototype Development* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 0399*** | | | | |
| Prototype Development, Experimentation and Demonstration | 4 | 2017 | 4 | 2019 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603382N / *Advanced Combat Systems Tech* | Project (Number/Name)<br>3422 / *SHARC Surface Platform* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3422: *SHARC Surface Platform* | 0.000 | 0.000 | 6.775 | 9.935 | - | 9.935 | 11.445 | 13.459 | 2.968 | 0.000 | 0.000 | 44.582 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The SHARC demonstration project is part of the Department of Defense Third Offset Strategy as one element in the Sensor Grid category for 24/7 autonomy infused Situational Awareness (SA). This project will purchase Commercial-off-the-Shelf SHARC Platforms (wave gliders) and integrate four (4) unique Government-owned classified mission payloads focused on the detection of threats. These capabilities will enable CONOPS development in an operationally relevant environment to demonstrate how these technologies can improve the SA to the battlespace Commanders.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Sensor Hosting Autonomous Remote Craft (SHARC) | 0.000 | 6.775 | 9.935 | 0.000 | 9.935 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** This is a new project beginning in FY2018 - This project will demonstrate the warfighting utility of multiple, simultaneous, wideband data links for signal and imagery data transmission between host assets and Operational level processing systems. | | | | | |
| ***FY 2018 Plans:***<br>Emerging technologies and engineering innovations from Naval/DoD research and development and industry, will be integrated to demonstrate secure and reliable collection, analysis, and fusion of ISR and targeting data from organic assets and sensors. This project will demonstrate the warfighting utility of multiple, simultaneous, wideband data links for signal and imagery data transmission between host assets and Operational level processing systems. Additionally, technologies providing Tactical level access to host asset ISR data will be demonstrated. This project will integrate mature technologies developed in the areas of low probability of intercept and detection (LPI/LPD) techniques, high data rate exchange, long-range multi-band and wideband links, networked nodes and software-defined modes, encryption, and signal processing modules. Additional details are available at higher classification levels. | | | | | |
| ***FY 2019 Base Plans:***<br>Complete requirements analysis and update component and subsystem specifications as required. Procure required SHARC platforms to include additional platforms to meet USPACOM emergent requirements. SPAWAR SSC Charleston will conduct initial integration and functional lab testing of classified payloads. The Maritime | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>3422 / *SHARC Surface Platform* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Surveillance Systems (MSS) Program Office (PEO SUBS, PMS-485) will initiate and coordinate the development of system level test plans and conduct initial system level test and evaluation to assess performance.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Increase in FY2019 base funding is required to enhance capabilities for additional SHARC platforms and to support emergent USPACOM requirements. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 6.775 | 9.935 | 0.000 | 9.935 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The Maritime Surveillance Systems (MSS) Program Office (PEO SUB PMS 485) will procure commercial wave gliders from Boeing Liquid Robotics Division (FFP Contract) and TBD Government organizations and Contractors for sensor systems X,Y,Z (CPFF). PMS 485 will task SPAWAR SSC Charleston to refurbish two type V sensor systems and for the engineering and technical integration, testing, and demonstration support. Sensors V,X,Y, and Z are all classified payloads.

**E. Performance Metrics**

Performance metrics are specific to each of the projects funded. All will include measures identified in the Statement of Objectives (SOO), including completions, successes, terminations, and iterative prototype cycle times reported against schedules and deliverables stated in the requirement documents.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603382N / *Advanced Combat Systems Tech* | Project (Number/Name)<br>3422 / *SHARC Surface Platform* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Requirements analysis | MIPR | Naval Weapons Development Center : Norfolk, VA | 0.000 | 0.000 | | 0.105 | Oct 2017 | 0.050 | Oct 2018 | - | | 0.050 | 0.000 | 0.155 | - |
| Requirements analysis | MIPR | PMS-485 Maritime Surveillance System : Washington Navy Yard, DC | 0.000 | 0.000 | | 0.190 | Oct 2017 | 0.050 | Oct 2018 | - | | 0.050 | 0.000 | 0.240 | - |
| Requirements analysis | MIPR | SPAWAR SSC : North Charleston, SC | 0.000 | 0.000 | | 0.600 | Oct 2017 | 0.200 | Oct 2018 | - | | 0.200 | 0.000 | 0.800 | - |
| Purchase COTS SHARC platforms | C/FP | PMS-485 Maritime Surveillance System : Washington Navy Yard, DC | 0.000 | 0.000 | | 1.440 | Jan 2018 | 4.135 | Dec 2018 | - | | 4.135 | 0.000 | 5.575 | - |
| Procure and mature Sensor technologies | C/CPFF | SPAWAR SSC : North Charleston, SC | 0.000 | 0.000 | | 1.740 | Jan 2018 | 0.000 | Dec 2018 | - | | 0.000 | 0.000 | 1.740 | - |
| 5. Build/Assemble/ Integrate Phase/Lab Test | C/BA | SPAWAR SSC : North Charleston, SC | 0.000 | 0.000 | | 1.750 | Mar 2018 | 4.000 | Mar 2019 | - | | 4.000 | 0.000 | 5.750 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 5.825 | | 8.435 | | - | | 8.435 | 0.000 | 14.260 | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Test & Evaluation Phase | MIPR | Naval Weapons Development Center : Norfolk, VA | 0.000 | 0.000 | | 0.250 | Oct 2017 | 0.400 | Mar 2019 | - | | 0.400 | 0.000 | 0.650 | - |
| Test & Evaluation Phase | MIPR | PMS-485 Maritime Surveillance System : Washington Navy Yard, DC | 0.000 | 0.000 | | 0.200 | Oct 2017 | 0.300 | Mar 2019 | - | | 0.300 | 0.000 | 0.500 | - |
| Test & Evaluation Phase | MIPR | SPAWAR SSC : North Charleston, SC | 0.000 | 0.000 | | 0.200 | Oct 2017 | 0.300 | Mar 2019 | - | | 0.300 | 0.000 | 0.500 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.650 | | 1.000 | | - | | 1.000 | 0.000 | 1.650 | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603382N / *Advanced Combat Systems Tech* | Project (Number/Name)<br>3422 / *SHARC Surface Platform* | |

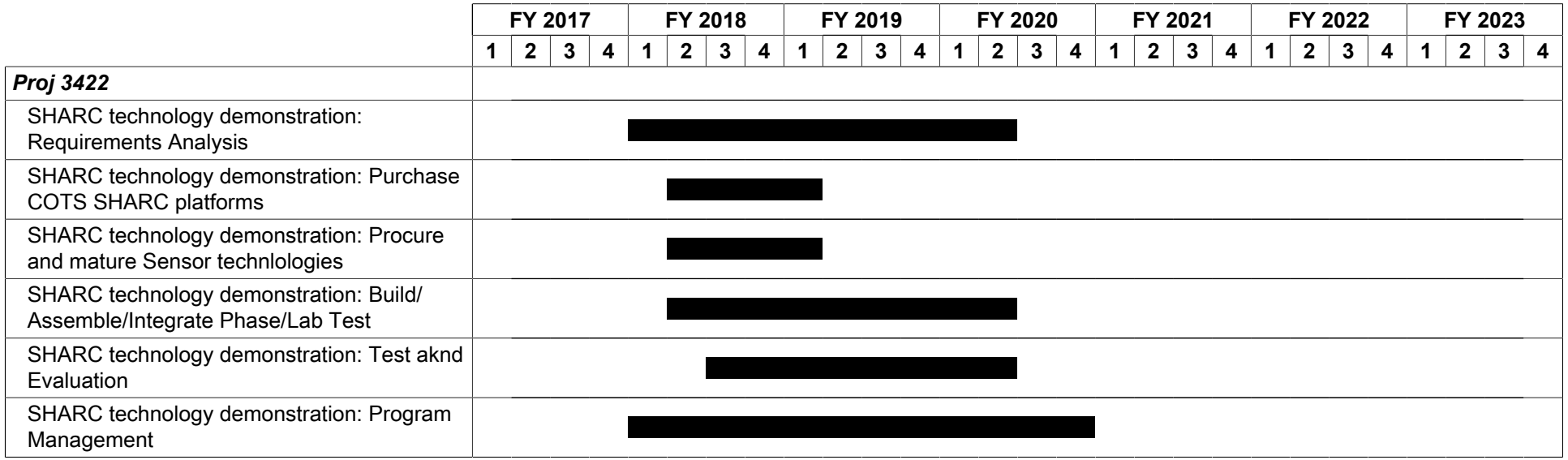
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Government Oversight and Manage Project | MIPR | PMS-485 Maritime Surveillance System : Washington Navy Yard, DC | 0.000 | 0.000 | | 0.300 | Oct 2017 | 0.500 | Oct 2018 | - | | 0.500 | 0.000 | 0.800 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.300 | | 0.500 | | - | | 0.500 | 0.000 | 0.800 | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 6.775 | | 9.935 | | - | | 9.935 | 0.000 | 16.710 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>3422 / *SHARC Surface Platform* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>3422 / *SHARC Surface Platform* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3422*** | | | | |
| SHARC technology demonstration: Requirements Analysis | 1 | 2018 | 2 | 2020 |
| SHARC technology demonstration: Purchase COTS SHARC platforms | 2 | 2018 | 1 | 2019 |
| SHARC technology demonstration: Procure and mature Sensor technlologies | 2 | 2018 | 1 | 2019 |
| SHARC technology demonstration: Build/Assemble/Integrate Phase/Lab Test | 2 | 2018 | 2 | 2020 |
| SHARC technology demonstration: Test aknd Evaluation | 3 | 2018 | 2 | 2020 |
| SHARC technology demonstration: Program Management | 1 | 2018 | 4 | 2020 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603382N / *Advanced Combat Systems Tech* | Project (Number/Name)<br>3423 / *LOCUST* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3423: *LOCUST* | 0.000 | 0.000 | 3.500 | 3.454 | - | 3.454 | 2.960 | 5.948 | 7.940 | 8.103 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

Project 3423 - Low Cost Unmanned Air Systems (UAS) Swarming Technology (LOCUST)

**A. Mission Description and Budget Item Justification**

The LOCUST demonstration is part of the Department of Defense Third Offset Strategy as one element in the Effector Grid category for small autonomous systems. LOCUST leverages the BA-3 Innovative Naval Prototype program developing and demonstrating swarming technology. The BA-3 effort is developing both the air vehicle, UAS swarming behaviors, and miniaturized sensor systems. ONR has demonstrated an autonomous system capable of launching 33 UASs in 40 seconds and flying them in a coordinated swarm. This BA-4 effort is trailing the BA-3 demonstration of technologies by a fiscal quarter and then demonstrating the technology in operationally relevant environments with military mission applications.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** LOCUST | 0.000 | 3.500 | 3.454 | 0.000 | 3.454 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** This is a new project in FY2018 - Demonstrate mixed-initiative UAV swarming behaviors, enable the development of payload appropriate CONOPS/TTPs for Many Vehicle/Many Salvo swarms, and provide unmanned system capability to degrade threat Integrated Air Defense Systems (IADS) in support of follow-on manned system operations. | | | | | |
| ***FY 2018 Plans:***<br>Integrate and demonstrate a scalable system of inexpensive, commoditized Unmanned Aerial Vehicles (UAVs) with swarming behaviors providing two distinct mission capabilities. Phase 1 will develop and demonstrate both air- and ground-launched counter-Improvised Explosive Device (IED) and communications jamming capabilities to support a Marine Corps unit. Phase 2 will develop and demonstrate an unmanned undersea vehicle (UUV)-launched Swarm for counter-Integrated Air Defense Systems (IADS) in support of naval units. This project will demonstrate mixed-initiative UAV swarming behaviors developed by the BA-3 activity, enable the development of payload appropriate CONOPS/TTPs for Many Vehicle/Many Salvo swarms, and provide unmanned system | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>3423 / *LOCUST* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| capability to degrade threat IADS in support of follow-on manned system operations. Additional details are available at higher classification levels.<br><br>***FY 2019 Base Plans:***<br>The Marine Corps Warfighting Laboratory, Air Combat Elements Branch (MCWL ACE) will lead the completion of Phase I integration and test activities to assess functional performance of LOCUST Counter-IED subsystems and components installed on the MV-22 and USMC M-RZR or M-RZR trailer. Conduct system-level experimentation and demonstration of the prototype system. The Center for Naval Analysis will assess system performance for both the air- and ground-based LOCUST Counter-IED system and develop Concepts of Operations (CONOPS) and Tactics, Techniques, and Procedures (TTP) to support future USMC operations.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No significant change from FY2018 to FY2019. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 3.500 | 3.454 | 0.000 | 3.454 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

There are two phases for this non-acquisition project.

Phase 1 - Marine Corps Warfighting Laboratory (MCWL) Air Combat Element (ACE) will lead the Phase I effort in FY18 & 19. MCWL will procure additional launchers, LOCUST platforms and payloads. MCWL will work with the Common Launch Tube Program of Record to procure the multiple missile Common Launch Tube. MCWL will task NAWC AD to help integrate the launcher system onto the MV-22 and support flight test and flight certification. MCWL will use a supporting Warfare Center to integrate the launcher onto a Marine Corps Program of Record M-RZR or M-RZR trailer. MCWL ACE will closely coordinate with the BA-3 LOCUST program manager to procure the new 6" diameter, additive manufactured, air frame (purchase through BA-3 activity contract). MCWL Experimental Division will define CONOPS/TTPs, the experimental parameters and measures of effectiveness, and operational experiments suitable to apply the capability in a relevant operational environment to evaluate the military utility of the system to a small Marine Corps maneuver element. The Center for Naval Analysis will consolidate the post demonstration report for the systems military utility.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>3423 / *LOCUST* |

Phase II -ONR Code 30 will lead a Counter Integrated Air Defense System (IADS) in FY20 -22 to demonstrate the advantages of small swarming UAVs against IADS defenses. ONR Code 30 will work with the Naval Warfare Development Center (NWDC) to develop CONOPS / TTPS for this mission capability and fleet experimentation. NSWC Panama City Division (NSWC PCD) will provide operational and logistics support for the launch and recovery of the vehicles. This phase is delayed for two fiscal years to allow the INP to develop the miniaturized payloads required for an operational demo. This effort will mature the payloads for operational employment.

**E. Performance Metrics**

MCWL Experimental Division will define CONOPS/TTPs, the experimental parameters and measures of effectiveness, and operational experiments suitable to apply the capability in a relevant operational environment to evaluate the military utility of the system to a small Marine Corps maneuver element.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>3423 / *LOCUST* |

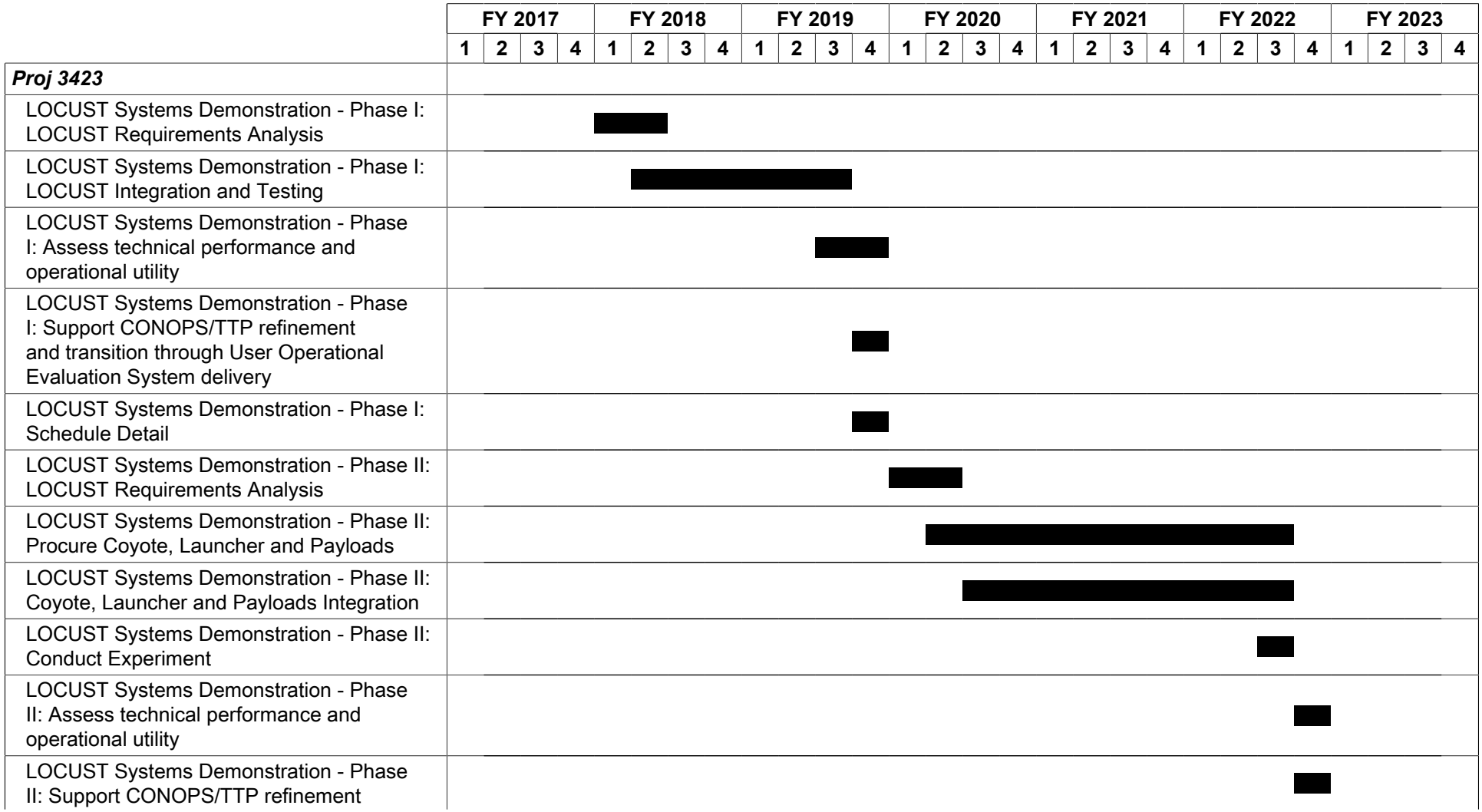
**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Requirements Analysis | MIPR | Marine Corps Warfighting Lab : Quantico, VA | 0.000 | 0.000 | | 0.500 | Oct 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Integration and Test | MIPR | Marine Corps Warfighting Lab : Quantico, VA | 0.000 | 0.000 | | 3.000 | Jan 2018 | 0.954 | Jan 2019 | - | | 0.954 | 0.000 | 3.954 | - |
| Conduct Prototype Experiment | MIPR | Marine Corps Warfighting Lab : Quantica, VA | 0.000 | 0.000 | | 0.000 | | 1.000 | Jun 2019 | - | | 1.000 | 0.000 | 1.000 | - |
| Assess Technical Performance | C/FP | Center for Naval Analyses : Arlington, VA | 0.000 | 0.000 | | 0.000 | | 0.500 | Aug 2019 | - | | 0.500 | 0.000 | 0.500 | - |
| CONOP/TTP refinement | C/FP | Center for Naval Analyses : Arlington, VA | 0.000 | 0.000 | | 0.000 | | 1.000 | Sep 2019 | - | | 1.000 | 0.000 | 1.000 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 3.500 | | 3.454 | | - | | 3.454 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 3.500 | | 3.454 | | - | | 3.454 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>3423 / *LOCUST* |



| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>3423 / *LOCUST* |

| | FY 2017 | | | | FY 2018 | | | | FY 2019 | | | | FY 2020 | | | | FY 2021 | | | | FY 2022 | | | | FY 2023 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| and transition through User Operational Evaluation System delivery | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>3423 / *LOCUST* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3423*** | | | | |
| LOCUST Systems Demonstration - Phase I: LOCUST Requirements Analysis | 1 | 2018 | 2 | 2018 |
| LOCUST Systems Demonstration - Phase I: LOCUST Integration and Testing | 2 | 2018 | 3 | 2019 |
| LOCUST Systems Demonstration - Phase I: Assess technical performance and operational utility | 3 | 2019 | 4 | 2019 |
| LOCUST Systems Demonstration - Phase I: Support CONOPS/TTP refinement and transition through User Operational Evaluation System delivery | 4 | 2019 | 4 | 2019 |
| LOCUST Systems Demonstration - Phase I: Schedule Detail | 4 | 2019 | 4 | 2019 |
| LOCUST Systems Demonstration - Phase II: LOCUST Requirements Analysis | 1 | 2020 | 2 | 2020 |
| LOCUST Systems Demonstration - Phase II: Procure Coyote, Launcher and Payloads | 2 | 2020 | 3 | 2022 |
| LOCUST Systems Demonstration - Phase II: Coyote, Launcher and Payloads Integration | 3 | 2020 | 3 | 2022 |
| LOCUST Systems Demonstration - Phase II: Conduct Experiment | 3 | 2022 | 3 | 2022 |
| LOCUST Systems Demonstration - Phase II: Assess technical performance and operational utility | 4 | 2022 | 4 | 2022 |
| LOCUST Systems Demonstration - Phase II: Support CONOPS/TTP refinement and transition through User Operational Evaluation System delivery | 4 | 2022 | 4 | 2022 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603382N / *Advanced Combat Systems Tech* | Project (Number/Name)<br>3424 / *Heterogeneous Collaborative Unmanned Systems (HCUS)* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3424: *Heterogeneous Collaborative Unmanned Systems (HCUS)* | 0.000 | 0.000 | 8.000 | 7.896 | - | 7.896 | 3.922 | 0.000 | 0.000 | 0.000 | 0.000 | 19.818 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

This is a new project in FY2018 - Develop integrated, adaptable systems of low cost, heterogeneous unmanned platforms capable of autonomous, collaborative behaviors to execute an operational naval mission.

**A. Mission Description and Budget Item Justification**

The HCUS demonstration is part of the Department of Defense Third Offset Strategy as one element in the Effector Grid category for small autonomous systems. HCUS provides autonomous, tactical monitoring of an adversary's port-sized littoral area for an extended period of time with capability to apply limited offensive effects on-demand. Vehicles and sensors are intended to be used in contested environments - employing local communications nets, autonomous vehicle behavior, low bandwidth command links and local navigation with no requirement for GPS input.

HCUS systems can be encapsulated and deployed as a single payload, or a small number of payload packages designed for specific missions. The payloads can be carried into theater by various manned or unmanned platforms depending on the degree of stealth required. A week-long project demonstration will simulate covert deployment, operations of autonomous UAVs over the area of interest, data exfiltration to a remote operator, autonomous UAV recharging via USVs and/or UUVs, deployment of unmanned ground sensors for persistent sensing, and remote operator on-demand offensive attack on a simulated target.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Heterogeneous Collaborative Unmanned Systems (HCUS) | 0.000 | 8.000 | 7.896 | 0.000 | 7.896 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Develop integrated, adaptable systems of low cost, heterogeneous unmanned platforms capable of autonomous, collaborative behaviors to execute an operational naval mission. This project leverages low cost UAV, UUV, and USV advancements in additive manufacturing, advanced autonomy, commercial components, and advanced sensing technologies. HCUS components are rapidly producible, expendable assets employed to minimize risk to manned platforms while increasing mission station time as recovery and return-to-base are not required. Additional details are available at higher classification levels. | | | | | |
| ***FY 2019 Base Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>3424 / *Heterogeneous Collaborative Unmanned Systems (HCUS)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Conduct Government program management and oversight of HCUS development activities. Johns Hopkins University Applied Physics Laboratory, in conjunction with NSWC Dahlgren Division, will complete HCUS system-level design and integration and commence manufacturing of initial HCUS systems.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No significant change from FY2018 to FY2019 | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 8.000 | 7.896 | 0.000 | 7.896 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

NSWCDD will provide Government oversight to the project and develop a multi-domain mission planning system compatible with the Aegis Combat System and Ship Self Defense System (SSDS) capable of tasking the JHU-APL autonomous systems. University Affiliated Research Center John Hopkins University: Applied Physics Laboratory will be responsible for the design and development of additive manufactured quad-copters, UUV launch system for UAV launch, low-profile USVs with commercial sensor systems, and unattended ground sensors (UGS) with a UGS deployment capability, the network backbone and long haul communications back to a combat system or Maritime Operations Center.

**E. Performance Metrics**

Performance metrics are specific to each of the projects funded. All will include measures identified in the Statement of Objectives (SOO), including completions, successes, terminations, and iterative prototype cycle times reported against schedules and deliverables stated in the requirement documents.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>3424 / *Heterogeneous Collaborative Unmanned Systems (HCUS)* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HCUS System Development | MIPR | JHU-APL : Laurel, MD | 0.000 | 0.000 | | 6.000 | Oct 2017 | 4.450 | Oct 2018 | - | | 4.450 | 0.000 | 10.450 | - |
| HCUS System Development | MIPR | Naval Surface Warfare Center DD : Dahlgren, VA | 0.000 | 0.000 | | 1.500 | Oct 2017 | 2.946 | Oct 2018 | - | | 2.946 | 0.000 | 4.446 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 7.500 | | 7.396 | | - | | 7.396 | 0.000 | 14.896 | N/A |

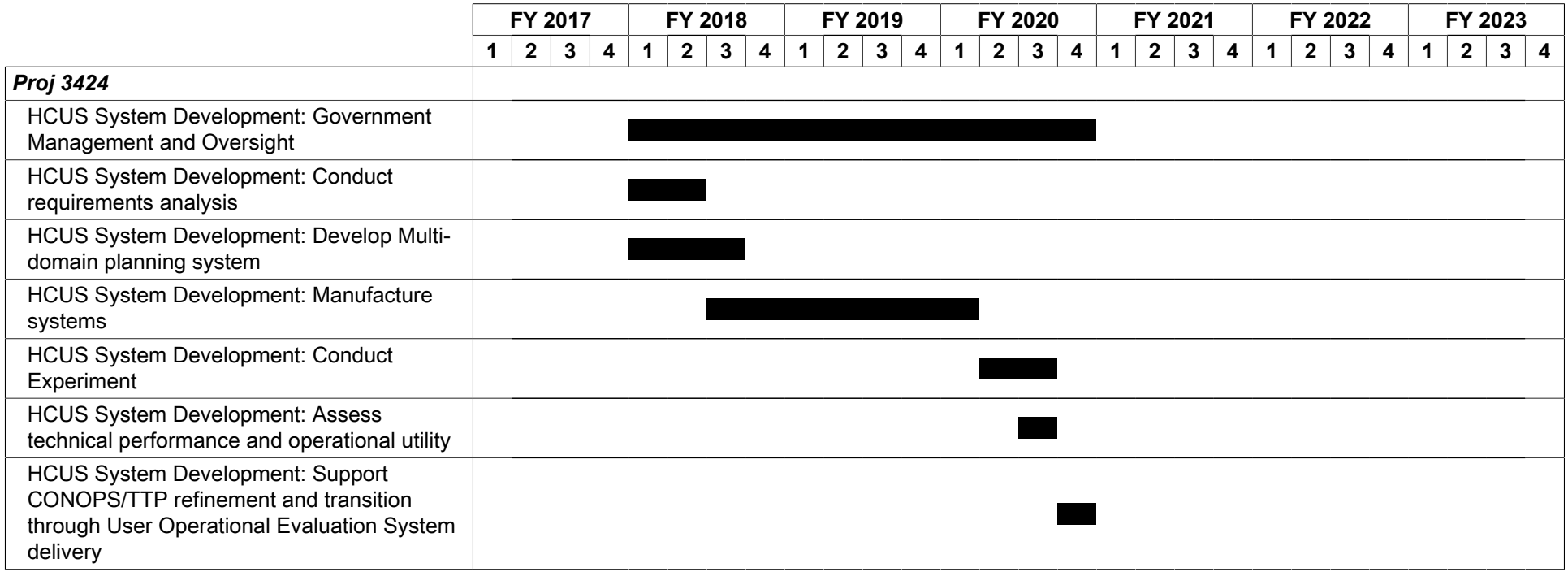
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Government Management and Oversight | MIPR | Naval Surface Warfare Center DD : Dahlgren, VA | 0.000 | 0.000 | | 0.500 | Oct 2017 | 0.500 | Oct 2018 | - | | 0.500 | 0.000 | 1.000 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.500 | | 0.500 | | - | | 0.500 | 0.000 | 1.000 | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 8.000 | | 7.896 | | - | | 7.896 | 0.000 | 15.896 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>3424 / *Heterogeneous Collaborative Unmanned Systems (HCUS)* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>3424 / *Heterogeneous Collaborative Unmanned Systems (HCUS)* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3424*** | | | | |
| HCUS System Development: Government Management and Oversight | 1 | 2018 | 4 | 2020 |
| HCUS System Development: Conduct requirements analysis | 1 | 2018 | 2 | 2018 |
| HCUS System Development: Develop Multi-domain planning system | 1 | 2018 | 3 | 2018 |
| HCUS System Development: Manufacture systems | 3 | 2018 | 1 | 2020 |
| HCUS System Development: Conduct Experiment | 2 | 2020 | 3 | 2020 |
| HCUS System Development: Assess technical performance and operational utility | 3 | 2020 | 3 | 2020 |
| HCUS System Development: Support CONOPS/TTP refinement and transition through User Operational Evaluation System delivery | 4 | 2020 | 4 | 2020 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603382N / *Advanced Combat Systems Tech* | Project (Number/Name)<br>3437 / *EMW/SEWIP/SSEE Accelerator* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3437: *EMW/SEWIP/SSEE Accelerator* | 0.000 | 0.000 | 0.000 | 21.584 | - | 21.584 | 23.771 | 23.773 | 0.000 | 0.000 | 0.000 | 69.128 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

This is a new project in FY2019 - Electromagnetic Maneuver Warfare/Surface Electronic Warfare Improvement Program to improve real time Electro-Magnetic Maneuver Warfare operations.

**A. Mission Description and Budget Item Justification**

The Electromagnetic Maneuver Warfare/Surface Electronic Warfare Improvement Program/Ship's Signals Exploitation Equipment (EMW/SEWIP/SSEE) Accelerator is part of the Department of Defense Third Offset Strategy to improve real time Electro-Magnetic Maneuver Warfare operations. EMW/SEWIP/SSEE Accelerator leverages the S&T Budget Activity (BA)-3 Electro-Magnetic Maneuver Warfare technology developments specifically in cross platform operations. The BA-3 effort is developing high speed sensor and electro-magnetic networking, real time spectrum operations and passive targeting technologies. ONR has demonstrated elements of next generation networking, passive tracking, and cross platform combat system coordination. This BA-4 effort is trailing the BA-3 demonstration of technologies deploying and demonstrating the technology in operationally relevant environments with military mission applications. The deployment will allow the ONR to significantly reduce risk, incorporate early warfighter improvements and test with real world data and scenarios.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** EMW/SEWIP/SSEE Accelerator | 0.000 | 0.000 | 21.584 | 0.000 | 21.584 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** EMW/SEWIP/SSEE accelerator builds off of two BA-3 efforts: Surface platform arrays, radios and control software were developed under the Multi-Link CDL System Future Naval Capability and airborne relay were developed within the High Altitude Relay and Routing Future Naval Capability. To date ONR has demonstrated 4-beam CDL surface arrays, radios and controls via land based motion simulators, while the airborne relay functionality has been demonstrated on a P-3 platform in a relevant environment. This is a new project for this PE in FY2019 to develop integrated cross platform active and passive sensing solutions, next generation network and real time spectrum operations. | | | | | |
| ***FY 2018 Plans:***<br>N/A | | | | | |
| ***FY 2019 Base Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>3437 / *EMW/SEWIP/SSEE Accelerator* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Develop and test a multi-beam next generation network allowing significantly more throughputs with low latency designed for cross platform combat system integration, applications to coordinate multiple disparate Electronic Warfare (EW) systems, passive targeting algorithms and real time spectrum operations. This technology accelerator will operationally field 3 shipsets for trials and evaluation.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>This is a new project in FY2019 | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 0.000 | 21.584 | 0.000 | 21.584 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Projects identified for execution under this project number are non-acquisition programs. Each project will develop a project plan to support project execution. Project plans will include a project schedule and technical requirements and objectives to measure project performance. Based on prior BA-3 work prototype contracts are in place and can be used to develop hardware for at sea trials. Software and ship installation will are expected to use a combination of existing shipyard contracts and government field activities.

**E. Performance Metrics**

Performance metrics are specific to each of the projects funded. All will include measures identified in the objective statements, including completions, successes, terminations, and iterative development prototype cycle times.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>3437 / *EMW/SEWIP/SSEE Accelerator* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Prototype Development | MIPR | NSWC : various | 0.000 | 0.000 | | 0.000 | | 9.084 | Oct 2018 | - | | 9.084 | 0.000 | 9.084 | - |
| Prototype Development | PO | NAWC : various | 0.000 | 0.000 | | 0.000 | | 5.000 | Oct 2018 | - | | 5.000 | 0.000 | 5.000 | - |
| Prototype Development | MIPR | SUPSHIP : Bath Maine | 0.000 | 0.000 | | 0.000 | | 3.000 | Oct 2018 | - | | 3.000 | 0.000 | 3.000 | - |
| Prototype Development | MIPR | NRL : Washington, DC | 0.000 | 0.000 | | 0.000 | | 4.500 | Oct 2018 | - | | 4.500 | 0.000 | 4.500 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 21.584 | | - | | 21.584 | 0.000 | 21.584 | N/A |

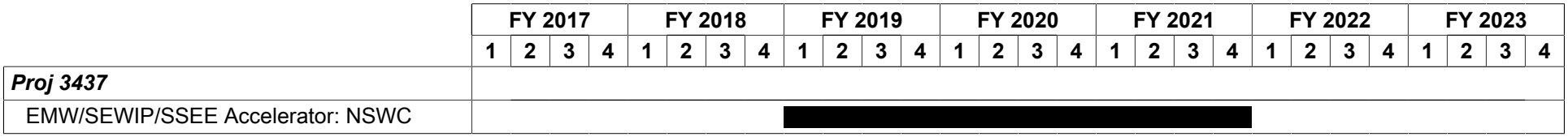
**Remarks**

NSWC: Prototype development of shipboard next generation networking apertures and EMW cross platform software.
NAWC: Prototype development of airborne next generation apertures and networking software.
SUPSHIP: Installation and testing of Cross platform EMW accelerator prototype on 2 Navy test vessels.
NRL: Installation and testing of Cross platform EMW accelerator prototype on Navy maritime patrol aircraft.

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 0.000 | | 21.584 | | - | | 21.584 | 0.000 | 21.584 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>3437 / *EMW/SEWIP/SSEE Accelerator* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>3437 / *EMW/SEWIP/SSEE Accelerator* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3437*** | | | | |
| EMW/SEWIP/SSEE Accelerator: NSWC | 1 | 2019 | 4 | 2021 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603382N / *Advanced Combat Systems Tech* | Project (Number/Name)<br>3438 / *Innovative Naval Prototype (INP) Transition (6.4)* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3438: *Innovative Naval Prototype (INP) Transition (6.4)* | 0.000 | 0.000 | 0.000 | 15.059 | - | 15.059 | 23.203 | 30.229 | 33.524 | 40.811 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

This is a new project unit (PU) in FY2019. This PU is intended to provide advanced component development and prototyping for selected technologies maturing out of or supporting ONR's Leap Ahead Technology (LA-Tech) and Innovative Naval Prototype (INP) BA3 portfolio.

**A. Mission Description and Budget Item Justification**

The efforts described in this mission area address the advanced component development and prototype demonstration associated with ONR's Innovative Naval Prototypes (INP) Program and the Leap Ahead Technology (LA-Tech) investments. INP and LA-Tech investments represent game changing technologies with the potential to revolutionize operational concepts. They are disruptive in nature as they would dramatically change the way naval forces fight. INPs and LA-Techs push the imagination of our nation's technical talent to deliver transformational warfighting capabilities. Successful demonstrations are intended to present the Department of the Navy with a programmatic challenge as these new capabilities can lead to the obsolescence of existing capabilities and significant decisions as to the path forward for integrating the new technological capabilities into the warfighting systems of the future.

ONR manages a continuum of INP and LA-Tech development from BA2 to BA3 to BA4. The goal of these BA4 investments is to further mature development and expend efforts necessary to evaluate integrated technologies, representative modes or prototype systems in high fidelity and realistic operating environments. This BA4 investment includes system specific efforts that help expedite technology transition from the laboratory to operational use. Emphasis is on proving component and subsystem maturity prior to integration in major and complex systems and may involve risk reduction initiatives. Projects in this category involve efforts prior to Milestone B and are referred to as advanced component development activities and include technology demonstrations. It is the goal of these projects to achieve Technology Readiness Levels 6 or 7. Successful experimentation and demonstration highlights the viability of new technological capabilities that could be implemented if an acquisition program were to be established to support further development. The portfolio is periodically refreshed through the selection of new INPs and LA-Tech investments as existing ones are completed.

INP, LA-Tech, and supporting technology investments may include R-2 Activities mission areas such as Unmanned and Autonomous Systems, Directed Energy / Electric Weapons, Electromagnetic Maneuver Warfare, Cyber Warfare, and Undersea Warfare.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Unmanned and Autonomous Systems: Advanced ASW sensor array package for medium sized unmanned surface vehicles. | 0.000 | 0.000 | 5.347 | 0.000 | 5.347 |
| ***Articles:*** | - | - | - | - | - |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>3438 / *Innovative Naval Prototype (INP) Transition (6.4)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Description:*** This is a new project beginning in FY2019 that will develop, integrate, experiment and demonstrate onboard a medium sized unmanned surface vehicle an advanced ASW sensor array package. This package is intended to be used on a platform being developed with Innovative Prototype (INP) and Leap Ahead Technology (LA-Tech) investments. That platform will serve as host for a wide variety of operationally focused capability payloads such as the advance ASW sensor array package being developed in this activity. These warfighter focused packages will enable Unmanned and Autonomous Systems platforms to support the requirement to augment manned systems with less expensive, unmanned, fully autonomous systems that can operate in all domains.<br><br>***FY 2018 Plans:***<br>N/A<br><br>***FY 2019 Base Plans:***<br>Initiate advanced component hardware and software development and the necessary system-to-hull integration which will lead to a prototype demonstration, in an operational environment, of an advanced ASW sensor array package capable of operational use onboard a medium sized autonomous, unmanned surface vehicle.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>This is a new project beginning in FY2019. | | | | | |
| ***Title:*** Unmanned and Autonomous Systems: Advanced ASW kinetic effects package for medium sized unmanned surface vehicle.<br>***Articles:*** | 0.000<br>- | 0.000<br>- | 5.712<br>- | 0.000<br>- | 5.712<br>- |
| ***Description:*** This is a new project beginning in FY2019 that will develop, integrate, experiment and demonstrate onboard a medium sized unmanned surface vehicle an advanced ASW kinetic effects package. This capability package is intended to be used on a platform being developed with Innovative Prototype (INP) and Leap Ahead Technology (LA-Tech) investments. That platform will serve as host for a wide variety of operationally focused capability payloads such as the advance ASW kinetic effects package being developed in this activity. These warfighter focused packages will enable Unmanned and Autonomous Systems platforms to support the requirement to augment manned systems with less expensive, unmanned, fully autonomous systems that can operate in all domains. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>3438 / *Innovative Naval Prototype (INP) Transition (6.4)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***FY 2018 Plans:***<br>N/A<br>***FY 2019 Base Plans:***<br>Initiate advanced component development and the necessary system-to-hull integration which will lead to prototype demonstration, in an operational environment, of an advanced ASW kinetic effects package capable of operational use onboard a medium sized autonomous, unmanned surface vehicle.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>This is a new project beginning in FY2019. | | | | | |
| ***Title:*** Unmanned and Autonomous Systems: Advanced aerial lift package for medium sized unmanned surface vehicle.<br>***Articles:***<br>***Description:*** This is a new project beginning in FY2019 that will develop, integrate, experiment and demonstrate onboard a medium sized unmanned surface vehicle an advanced aerial lift package. This capability package will dramatically increase the range of regard of various sensor payloads that will be carried aloft. It is intended to be used on a platform being developed with Innovative Prototype (INP) and Leap Ahead Technology (LA-Tech) investments. That platform will serve as host for a wide variety of operationally focused capability payloads such as the advance aerial lift package being developed in this activity. These warfighter focused payloads will enable Unmanned and Autonomous Systems platforms to support the requirement to augment manned systems with less expensive, unmanned, fully autonomous systems that can operate in all domains.<br>***FY 2018 Plans:***<br>N/A<br>***FY 2019 Base Plans:***<br>Initiate advanced component hardware development and the necessary system-to-hull integration which will lead to prototype demonstration, in an operational environment, of an advanced aerial lift package capable of operational use onboard a medium sized autonomous, unmanned surface vehicle.<br>***FY 2019 OCO Plans:*** | 0.000<br>- | 0.000<br>- | 4.000<br>- | 0.000<br>- | 4.000<br>- |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>3438 / *Innovative Naval Prototype (INP) Transition (6.4)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>This is a new project beginning in FY2019. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 0.000 | 15.059 | 0.000 | 15.059 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The projects identified for execution are non-acquisition programs. The Office of Naval Research will provide Government oversight to the projects. Each project will develop a project plan to support execution. Project plans will include a schedule and the necessary technical requirements and objectives to measure and evaluate performance. Additionally, each project will be subjected to experimentation then demonstrated in operationally relevant environments to assess their ability to meet warfighter requirements. Project deliverables will include the actual integrated hardware/software prototype systems, test reports, and technical data, necessary to support decision making. These decisions include the transition of technologies to acquisition, further refinement of the technology, or termination and reinvestment of remaining funds to other technologies that add military value.

**E. Performance Metrics**

In all cases, the technologies being developed within this PE support the Department of the Navy INP and Leap Ahead Programs and are managed at the Office of Naval Research. The primary technological metrics used in this PE involve experiments and tests that demonstrate, in an operationally relevant environment, the proof of concept for the technological capability being developed. Technology development is informed by periodic interaction with Naval warfighters, resource sponsors and the acquisition community. At the lowest level, each project is evaluated against technical and financial milestones on a frequent basis. Annually, each project is reviewed in depth for technical performance and development status by the Chief of Naval Research. Department of the Navy leadership is briefed on the portfolio's status by the Chief of Naval Research.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603382N / *Advanced Combat Systems Tech* | Project (Number/Name)<br>3438 / *Innovative Naval Prototype (INP) Transition (6.4)* | |

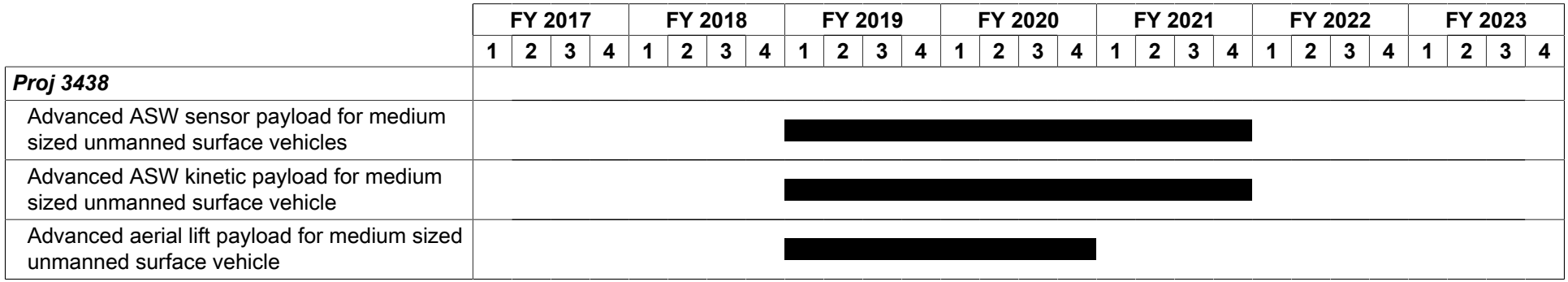
**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Advanced ASW sensor payload | MIPR | NUWC : Newport, Rhode Island | 0.000 | 0.000 | | 0.000 | | 1.308 | Oct 2018 | - | | 1.308 | Continuing | Continuing | Continuing |
| Advanced ASW sensor payload | MIPR | JHU-APL : Columbia, Maryland | 0.000 | 0.000 | | 0.000 | | 1.308 | Oct 2018 | - | | 1.308 | Continuing | Continuing | Continuing |
| Advanced ASW sensor payload | MIPR | SSC-PAC : San Diego, California | 0.000 | 0.000 | | 0.000 | | 1.308 | Oct 2018 | - | | 1.308 | Continuing | Continuing | Continuing |
| Advanced ASW sensor payload | MIPR | NASA Jet Propulsion Lab : Pasedena, California | 0.000 | 0.000 | | 0.000 | | 1.300 | Oct 2018 | - | | 1.300 | Continuing | Continuing | Continuing |
| Advanced ASW kinetic payload | MIPR | PSU -ARL : State College, Pennsylvania | 0.000 | 0.000 | | 0.000 | | 4.111 | Oct 2018 | - | | 4.111 | Continuing | Continuing | Continuing |
| Advanced ASW kinetic payload | MIPR | SSC-PAC : San Diego, California | 0.000 | 0.000 | | 0.000 | | 0.900 | Oct 2018 | - | | 0.900 | Continuing | Continuing | Continuing |
| Advanced ASW kinetic payload | MIPR | NASA Jet Propulsion Lab : Pasedena, California | 0.000 | 0.000 | | 0.000 | | 0.900 | Oct 2018 | - | | 0.900 | Continuing | Continuing | Continuing |
| Advanced aerial lift payload | MIPR | NSWC-CD : Bethesda, Maryland | 0.000 | 0.000 | | 0.000 | | 1.308 | Oct 2018 | - | | 1.308 | Continuing | Continuing | Continuing |
| Advanced aerial lift payload | MIPR | NASA Jet Propulsion Lab : Pasedena, California | 0.000 | 0.000 | | 0.000 | | 1.308 | Oct 2018 | - | | 1.308 | Continuing | Continuing | Continuing |
| Advanced aerial lift payload | MIPR | SSC-PAC : San Diego, California | 0.000 | 0.000 | | 0.000 | | 1.308 | Oct 2018 | - | | 1.308 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 15.059 | | - | | 15.059 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 0.000 | | 15.059 | | - | | 15.059 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>3438 / *Innovative Naval Prototype (INP) Transition (6.4)* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603382N / *Advanced Combat Systems Tech* | **Project (Number/Name)**<br>3438 / *Innovative Naval Prototype (INP) Transition (6.4)* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3438*** | | | | |
| Advanced ASW sensor payload for medium sized unmanned surface vehicles | 1 | 2019 | 4 | 2021 |
| Advanced ASW kinetic payload for medium sized unmanned surface vehicle | 1 | 2019 | 4 | 2021 |
| Advanced aerial lift payload for medium sized unmanned surface vehicle | 1 | 2019 | 4 | 2020 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603502N *I Surface & Shallow Water MCM* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 1,301.031 | 126.761 | 154.117 | 62.727 | - | 62.727 | 76.052 | 77.092 | 86.408 | 100.631 | Continuing | Continuing |
| 0530: *Mine Hunt Systems* | 280.439 | 9.469 | 9.761 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 299.669 |
| 1233: *Surface MCM Mid-life Upgrade* | 156.226 | 4.073 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 160.299 |
| 1234: *Unmanned Surface Vehicle (USV)* | 46.221 | 42.069 | 23.594 | 28.645 | - | 28.645 | 19.915 | 19.167 | 18.993 | 19.404 | Continuing | Continuing |
| 1235: *Mine Warfare Planning and Analysis* | 7.520 | 8.664 | 3.139 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 19.323 |
| 2094: *Unmanned Underwater Vehicle* | 64.860 | 21.945 | 60.187 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 146.992 |
| 2131: *Assault Breaching System* | 610.235 | 19.651 | 11.623 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 641.509 |
| 2989: *Barracuda* | 0.000 | 0.000 | 20.761 | 31.282 | - | 31.282 | 32.237 | 31.625 | 37.415 | 38.227 | Continuing | Continuing |
| 3123: *SMCM UUV* | 135.530 | 20.890 | 25.052 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 181.472 |
| 3428: *Medium Displacement Unmanned Surface Vehicle (MDUSV)* | 0.000 | 0.000 | 0.000 | 2.800 | - | 2.800 | 23.900 | 26.300 | 30.000 | 43.000 | Continuing | Continuing |

**Note**

FY 2019 and future funding for Projects 0530, 1233, and 1235 have been realigned to PE 0604127N; Project 2094 to PE 0604031N; Project 2131 to PE 0604126N and Project 3123 to 0604028N. Project 0530 realigned from PE 0603502N starting in FY 2019 included a $1.192 million reduction to account for the availability of prior year execution balances.

The FY 2019 funding request for remaining projects was reduced by $4.600 million to account for the availability of prior year execution balances.

**A. Mission Description and Budget Item Justification**

This program element provides resources for development of mine countermeasure systems to provide minehunting, minesweeping, and neutralization to counter known and projected mine threats. The mine countermeasures systems provide mobile, quick reaction forces capable of land or sea-based minehunting and minesweeping operations worldwide. Resources are for developing and deploying advanced mine-hunting and minesweeping systems and the intelligence and oceanographic capabilities that will enable mine warfare superiority. Tactics and techniques used vary across a diversity of environments and a diversity of threats, including both asymmetric and emerging. Resources provide for systems and support of mine warfare systems, maritime systems, and expeditionary systems to allow for continuous

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603502N *I Surface & Shallow Water MCM* |

operations of the Navy's warships and support vessels, other military vessels, and commercial vessels. Core capabilities include forward presence, deterrence, sea control, power projection, maritime security, humanitarian assistance and disaster response to maintain freedom of the seas. Increased capability includes conducting minefield reconnaissance (mine density and location) at high area search rates, improving detection capability, decreasing sensor false alarm rates, reducing or eliminating post-mission analysis detect, classify, identify, decide time, improving neutralization time, improving network communications, automatic target recognition, and achieving in-stride detect-to-engage capability. Concept of operations includes development of cooperative, unmanned, modular systems; the establishment of a capable networked command and control systems; and standing up an accurate and interactive environmental system with the ability to form and disseminate a Common Environmental Picture. Efforts benefit the Mine Countermeasure (MCM) force by transforming the Navy from the platform-centered legacy set of systems to a capability-centered force that is distributed, networked, and able to provide unique maritime influence and access across the entire maritime domain. Efforts also include undersea domain efforts associated with the Snakehead Large Displacement UUV (LDUUV), as well as efforts for the new Medium Displacement USV starting in FY19 which will serve as the unmanned surface vessel portion of the Navy's Future Surface Combatant (FSC) strategy.

The Surface Mine Countermeasures (SMCM) programs are in general platform independent and will provide detection, classification, localization, identification, neutralization, and influence clearance capabilities. Programs develop: (1) Unmanned minehunting capability for surface platforms; (2) the integration and improvement of new and existing systems (3) support for systems which detect, localize, classify, identify, and neutralize all mine types across MCM Avenger Class and other platforms; (4) systems for neutralizing mines and light obstacles through the entire water column to include deep water, open water, shallow water, very shallow water, surf zones, and beach landing craft zones in support of operations; (5) the integration of Unmanned Undersea Vehicles (UUVs) to meet Undersea Surveillance capabilities as well as other prioritized and enduring capabilities, requirements and gaps; (6) integrate hardware for experimental testing related to surface ship, aircraft, and other cross platform applications; and (7) provide for the future unmanned portion of the FSC strategy.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 165.775 | 154.117 | 233.873 | - | 233.873 |
| Current President's Budget | 126.761 | 154.117 | 62.727 | - | 62.727 |
| Total Adjustments | -39.014 | 0.000 | -171.146 | - | -171.146 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | 9.680 | 0.000 | | | |
| • SBIR/STTR Transfer | -3.694 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | -162.501 | - | -162.501 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -8.645 | - | -8.645 |
| • Congressional Directed Reductions Adjustments | -45.000 | - | - | - | - |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603502N *I Surface & Shallow Water MCM* |

**Change Summary Explanation**

Program Adjustments:

FY17 -$39,014K Total adjustments; Congressional Reductions: -$2,000K LDUUV Support Excess Growth, -$43,000K LDUUV - Continue Risk Reduction & Technology maturation effort only, -$3,694K SBIR, +$9,680K FY17 JUNE ATR Prior Approval Request.

FY18 No Change

FY19 -$171,146K Total adjustments; Program adjustments: -$145,106K realignment to new Program Elements; -$20,432K realignment of UUV, +$12,000K MCM Acceleration, -$10,000K past execution and congressional marks, +$2,800K Medium Displacement USV (MDUSV), +$2,500K synthetic trainer, -$3,090K ABS Excess growth, -$1,173K MEDAL unjustified growth; Other Rate Adjustments: -$5,792K under execution reduction, -$853K miscellaneous adjustments.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603502N / *Surface & Shallow Water MCM* | Project (Number/Name)<br>0530 / *Mine Hunt Systems* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0530: *Mine Hunt Systems* | 280.439 | 9.469 | 9.761 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 299.669 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

FY 2019 and future funding for Project 0530 is in Program Element (PE) 0604127N. Project realigned from PE 0603502N starting in FY 2019.

**A. Mission Description and Budget Item Justification**

This project contains resources for systems, subsystems, and sensors integrated for use with the new program MCM Unmanned Surface Vehicle (MCM USV) for mine detection, classification, localization, and identification in support of mine neutralization, and influence clearance capabilities. Research, development, test, and evaluation efforts are for increasing capability by decreasing time required to conduct Mine Countermeasures (MCM) operations, ensuring low risk to naval and commercial vessels, and removing the man from the minefield. Increased capability includes conducting minefield reconnaissance (mine density and location) at high area search rates, improving detection capability, decreasing sensor false alarm rates, and reducing post-mission analysis for detection, classification, and identification.

The AN/AQS-20 is a mine hunting and identification system with sensors housed in an underwater towed body. The sensors are designated for the detection, classification and localization of bottom, close-tethered, and volume targets, and also for the identification of bottom targets. The system will be deployed from the Littoral Combat Ship (LCS) as part of the MCM Mission Package or can be deployed from other Vessels of Opportunity (VOO). The MCM USV is the tow platform for the AN/AQS-20.

The AN/AQS-20 Block 1 (the AQS-20A) is undergoing a Pre-Planned Product Improvement (P3I) program to upgrade the Forward Looking Sonar (FLS) and Side-Looking Sonars (SLS) to improve Probability of Classifying a Mine-like object as a Mine, reduce False Classification, and improve Depth Localization performance to meet Block 2 (the AQS-20C) performance. The Forward Looking Sonar is being replaced with a new High Frequency Wideband Forward Looking Sonar (WBFLS) design. The SLS is being replaced with a new Multifunction SLS with Synthetic Aperture Sonar (SAS) capability, as well as, improved signal processing and Signal to Noise Ratio. The Block 1 P3I program began in FY 2012 and completed in FY 2017. Award and management for Block 2 production units began in FY 2014 (the AQS-20C). Materiel Reliability, obsolescence, and performance Engineering Change Proposal (ECP) efforts continue beyond FY2023.

In FY 2017, the AN/AQS-20 Block 2 P3I program conducted Synthetic Aperture Sonar (SAS) development and test. The AN/AQS-20 program also completed the initial build of algorithms and software components to be used for post mission analysis software tools for the AN/AQS-20 Block 2 (the AQS-20C). The Block 2 P3I program began in FY 2017 and
continues beyond FY 2023. Development and Material Reliability, obsolescence, and performance Engineering Change Proposal (ECP) efforts will continue beyond FY2023.

In FY 2018, the AN/AQS-20 Block 2 program (AQS-20C) is scheduled to conduct Developmental Testing (originally scheduled to start at end of FY17), initiate MCM USV integration, and initiation of MCM improvements for post mission analysis tools in support of Net-centric Sensor Analysis for Mine Warfare (NSAM) integration for

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>0530 / *Mine Hunt Systems* |

the Fleet Operators. The net effect of these tools combined with the more powerful AN/AQS-20 Block 2 sensors will be improved classification of mines, more accurate vertical localization, reduced false calls, and improved area clearance rate sustained. Improvements also include the collection and ingestion of in-situ environmental data used for mission planning to configure the sensor which optimizes sensor performance during missions. Development of these tools begins in FY 2018 and will continue through FY 2021.

In FY 2019 the project is realigned to Program Element 0604127N

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** AN/AQS-20 Product Development | 2.900 | 3.036 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>- Continue SAS Acoustic mine recognition development.<br>- Continue SAS Acoustic mine recognition ECP.<br>- Initiate algorithm development for AN/AQS-20 Block 2 PMA Improvements including NSAM integration.<br>- Complete development of the Mission Planning Optimizer used to configure the AN/AQS-20 Block 2 sensors.<br>- Initiate AN/AQS-20 Block 2 improvements in support of MCM USV integration.<br>- Complete initial Post Mission Analysis Software for AN/AQS-20 Block 2 (Q-20C) Multi-Function SLS and EOID.<br>- Correct deficiencies identified during testing. | | | | | |
| ***FY 2019 Base Plans:***<br>FY 2019 funding in Program Element (PE) 0604127N. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Project realigned to PE 0604127N from PE 0603502N starting in FY 2019. | | | | | |
| ***Title:*** AN/AQS-20 Support | 2.300 | 0.900 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>- Provide ongoing technical and management support to AN/AQS-20.<br>- Continue to conduct test minefield maintenance.<br>- Initiate AN/AQS-20 Block 2 Mission Planning and Post Mission Analysis Concept of Employment development.<br>- Update Information Assurance Plans in support of AN/AQS-20 Block 2 (Q-20C).<br>- Complete Depot Maintenance (Overhaul) Plan. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>0530 / *Mine Hunt Systems* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Complete Technical Insertion Plan.<br>***FY 2019 Base Plans:***<br>FY 2019 funding in Program Element (PE) 0604127N.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Project realigned to PE 0604127N from PE 0603502N starting in FY 2019. | | | | | |
| ***Title:*** AN/AQS-20 Test and Evaluation | 3.000 | 5.325 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>- Complete AN/AQS-20 Block 2 DT.<br>- Conduct AN/AQS-20 Block 2 PMA Data Collection with test mines under various conditions.<br>- Initiate SAS Acoustic recognition Testing.<br>***FY 2019 Base Plans:***<br>FY 2019 funding in Program Element (PE) 0604127N.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Project realigned to PE 0604127N from PE 0603502N starting in FY 2019. | | | | | |
| ***Title:*** AN/AQS-20 Management Services | 1.269 | 0.500 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>- Provide planning and management for the AN/AQS-20 program.<br>- Begin update of acquisition documentation in support of Full Rate Production (FRP) Decision Review.<br>- Continue to provide Program Office travel support.<br>***FY 2019 Base Plans:***<br>FY 2019 funding in Program Element (PE) 0604127N.<br>***FY 2019 OCO Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>0530 / *Mine Hunt Systems* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Project realigned to PE 0604127N from PE 0603502N starting in FY 2019. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 9.469 | 9.761 | 0.000 | 0.000 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • OPN/1601: *LCS MCM Mission Modules* | 29.724 | 55.870 | 124.147 | - | 124.147 | 204.324 | 245.108 | 227.068 | 234.109 | 1,421.551 | 2,691.282 |
| • RDTEN/0604127N/0530: *Mine Hunt Systems* | 0.000 | 0.000 | 7.579 | - | 7.579 | 8.861 | 7.234 | 4.447 | 4.548 | Continuing | Continuing |

**Remarks**

OPN/1601 funding line accounts for several programs, of which the AN/AQS-20 program is only a portion.

**D. Acquisition Strategy**

AN/AQS-20 LRIP procurement continued following Block 2 (AQS-20C units) competitive contract award in FY 2014. Continue to meet MCM MP requirements to support production of Block 2 units.

**E. Performance Metrics**

AN/AQS-20 - Successfully complete Block 2 DT in FY 2018.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603502N / *Surface & Shallow Water MCM* | Project (Number/Name)<br>0530 / *Mine Hunt Systems* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AN/AQS-20 Hardware/ Software Development Q-20 on the H-53 | SS/CPIF | Raytheon : Portsmouth, RI | 31.120 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 31.120 | - |
| AN/AQS-20 Hardware/ Software Development Q-20A on the H-60 | C/CPFF | Raytheon : Portsmouth, RI | 60.150 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 60.150 | - |
| AN/AQS-20 Hardware/ Software Development | WR | NSWC, PC : Panama City FL | 14.578 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 14.578 | - |
| AN/AQS-2A Hardware/ Software Development | C/FP | Northrop Grumman : Melbourne, FL | 4.572 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 4.572 | - |
| AN/AQS-20 P3I | C/CPFF | Raytheon : Portsmouth, RI | 17.391 | 1.100 | Nov 2016 | 0.509 | Nov 2018 | 0.000 | | - | | 0.000 | 0.000 | 19.000 | - |
| AN/AQS-20 P3I | C/CPFF | ARL/UT : Austin, TX | 9.017 | 0.600 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 9.617 | - |
| AN/AQS-20 P3I | WR | NSWC, PC : Panama City FL | 5.054 | 1.200 | Oct 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 6.254 | - |
| AN/AQS-20 Block 2 PMA | WR | NSWC, PC : Panama City FL | 0.000 | 0.000 | | 1.099 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 1.099 | - |
| AN/AQS-20 Block 2 PMA | C/CPFF | ARL/UT : Austin, TX | 0.000 | 0.000 | | 1.128 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 1.128 | - |
| AN/AQS-20 Block 2 Intergration | C/CPFF | Lockhead Martin : Not Specified | 0.000 | 0.000 | | 0.300 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.300 | - |
| AN/AQS-20 Materiel Reliability ECP Development | C/CPFF | Raytheon : Portsmouth, RI | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | - |
| AN/AQS-20 P3I | WR | Naval Research Lab : Stennis Space Center, MS | 0.225 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.225 | - |
| | | **Subtotal** | 142.107 | 2.900 | | 3.036 | | 0.000 | | - | | 0.000 | 0.000 | 148.043 | N/A |

**Remarks**

FY 2019 and future funding for Project 0530 is in Program Element (PE) 0604127N.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603502N / *Surface & Shallow Water MCM* | Project (Number/Name)<br>0530 / *Mine Hunt Systems* | |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AN/AQS-20 Engineering Services | WR | NSWC, PC : Panama City, FL | 31.976 | 0.410 | Oct 2016 | 0.135 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 32.521 | - |
| AN/AQS-20 Engineering Services | C/CPFF | Raytheon : Portsmouth, RI | 4.486 | 0.200 | Oct 2016 | 0.200 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 4.886 | - |
| AN/AQS-20 Engineering Services | Various | Various : Various | 54.018 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 54.018 | - |
| AN/AQS-20 Engineering Services 2 | SS/CPIF | Raytheon : Portsmouth, RI | 3.464 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.464 | - |
| AN/AQS-20 ILS Function | WR | NSWC, PC : Panama City FL | 7.618 | 1.165 | Oct 2016 | 0.200 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 8.983 | - |
| AN/AQS-20 ILS Function | SS/CPIF | Raytheon : Portsmouth, RI | 1.546 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.546 | - |
| AN/AQS-20 ILS Function | Various | Various : Various | 0.981 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.981 | - |
| AN/AQS-20 Engineering Services | WR | NSWC/CD : Carderock, MD | 0.660 | 0.165 | Oct 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.825 | - |
| AN/AQS-20 Engineering Services | WR | NSWC/NPT : Newport, RI | 0.355 | 0.360 | Oct 2016 | 0.365 | Oct 2017 | 0.000 | | - | | 0.000 | 0.000 | 1.080 | - |
| | | **Subtotal** | 105.104 | 2.300 | | 0.900 | | 0.000 | | - | | 0.000 | 0.000 | 108.304 | N/A |

**Remarks**

FY 2019 and future funding for Project 0530 is in Program Element (PE) 0604127N.

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AN/AQS-20 T&E Functions | WR | COTF : Norfolk, VA | 0.000 | 0.230 | Nov 2016 | 0.200 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.430 | - |
| AN/AQS-20 T&E Functions | WR | NSWC, PC : Panama City FL | 19.880 | 2.370 | Oct 2016 | 4.525 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 26.775 | - |
| AN/AQS-20 T&E Functions | C/CPFF | Raytheon : Portsmouth, RI | 4.134 | 0.400 | Apr 2017 | 0.600 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 5.134 | - |
| AN/AQS-20 T&E Functions | Various | Various : Various | 1.583 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.583 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>0530 / *Mine Hunt Systems* |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AN/AQS-20 T&E Functions | C/CPFF | ARL/UT : Austin, TX | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | - |
| | | **Subtotal** | 25.597 | 3.000 | | 5.325 | | 0.000 | | - | | 0.000 | 0.000 | 33.922 | N/A |

**Remarks**

FY 2019 and future funding for Project 0530 is in Program Element (PE) 0604127N.

COTF - Naval Command Operational Test and Evaluation Force

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AN/AQS-20 Management Services | TBD | Various : Various | 6.992 | 1.229 | Dec 2016 | 0.470 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 8.691 | - |
| AN/AQS-20 Travel | TBD | Various : Various | 0.627 | 0.040 | Mar 2017 | 0.030 | Mar 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.697 | - |
| AN/AQS-20 Acquisition Workforce Fund | Various | Various : Various | 0.012 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.012 | - |
| | | **Subtotal** | 7.631 | 1.269 | | 0.500 | | 0.000 | | - | | 0.000 | 0.000 | 9.400 | N/A |

**Remarks**

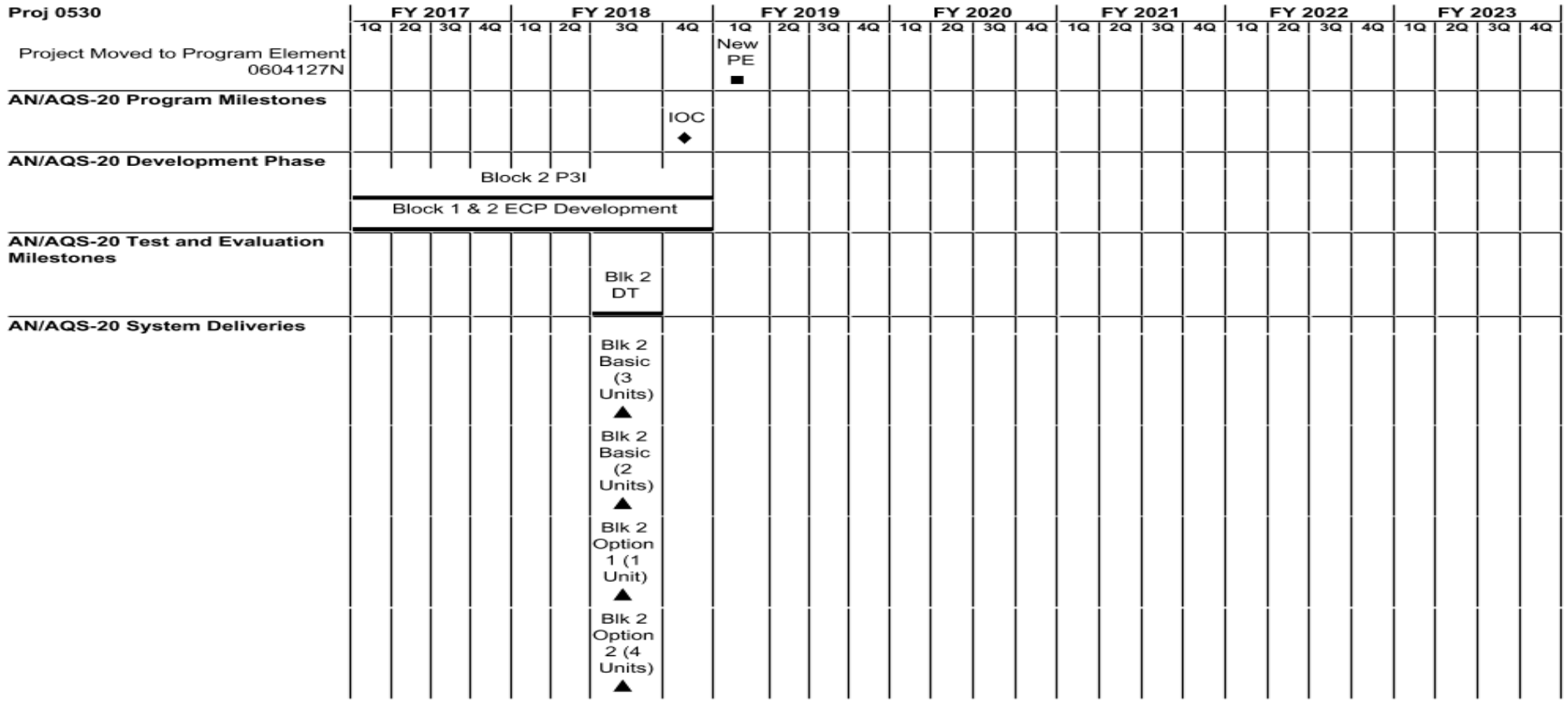
FY 2019 and future funding for Project 0530 is in Program Element (PE) 0604127N.

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 280.439 | 9.469 | | 9.761 | | 0.000 | | - | | 0.000 | 0.000 | 299.669 | N/A |

**Remarks**

FY 2019 and future funding for Project 0530 is in Program Element (PE) 0604127N.

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>0530 / *Mine Hunt Systems* |




*2019PB - 0603502N - 0530*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>0530 / *Mine Hunt Systems* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 0530*** | | | | |
| Project Moved to Program Element 0604127N: | 1 | 2019 | 1 | 2019 |
| AN/AQS-20 Program Milestones: Initial Operatonal Capablity (IOC) | 4 | 2018 | 4 | 2018 |
| AN/AQS-20 Development Phase: AN/AQS-20 Block 2 P3I | 1 | 2017 | 4 | 2018 |
| AN/AQS-20 Development Phase: AN/AQS-20 Materiel Reliability, Obsolesence, and Performance ECP Development (Block 1 & 2) | 1 | 2017 | 4 | 2018 |
| AN/AQS-20 Test and Evaluation Milestones: AN/AQS-20 Test Events Block 2 DT | 3 | 2018 | 3 | 2018 |
| AN/AQS-20 System Deliveries: AN/AQS-20 Block 2 Basic Award Systems (3 Units) | 3 | 2018 | 3 | 2018 |
| AN/AQS-20 System Deliveries: AN/AQS-20 Block 2 Basic Award Systems (2 Units) | 3 | 2018 | 3 | 2018 |
| AN/AQS-20 System Deliveries: AN/AQS-20 Block 2 Option 1 Award System (1 Unit) | 3 | 2018 | 3 | 2018 |
| AN/AQS-20 System Deliveries: AN/AQS-20 Block 2 Option 2 Award Systems (4 Units) | 3 | 2018 | 3 | 2018 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603502N / *Surface & Shallow Water MCM* | Project (Number/Name)<br>1233 / *Surface MCM Mid-life Upgrade* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1233: *Surface MCM Mid-life Upgrade* | 156.226 | 4.073 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 160.299 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

FY 2019 and future funding for Project 1233 is in Program Element (PE) 0604127N. Project realigned from PE 0603502N starting in FY 2019.

**A. Mission Description and Budget Item Justification**

This project provides resources for development, improvement and integration of MCM systems. A description of the major planned programs include the following:

1) AN/SQQ-32(V)4 High-Frequency, Wide Band (HFWB) is a technology upgrade to the AN/SQQ-32 Towed Body which will incorporate HFWB technology into the detection sonar to address performance deficiencies against new mine threats in the littorals. This upgrade will be installed on MCM-1 Class ships with the AN/SQQ-32(V)3 and will develop new transducer modules, fiber optic cable and modify topside processing and display software. 2) Mine Warfare and Environmental Decision Aids Library (MEDAL) is a software segment on the Global Command and Control System - Maritime (GCCS-M). MEDAL provides mine and mine warfare planning and evaluation tools and databases to the MCM Commander. 3) Develop and implement Mine Countermeasures Commander's Estimate of the Situation (MCM CES). 4) The Unmanned Influence Sweep System (UISS) utilizes an Unmanned Surface Vehicle (USV) integrated with an Unmanned Surface Sweep System (US3), a magnetic/acoustic sweep system developed to sweep acoustic/magnetic influence mines, which can be deployed from the Littoral Combat Ship (LCS) or a ship of opportunity; 5) The Multi-Function USV replaces the sweep system with a minehunting sensor. The capability leverages off a common USV to conduct minehunting missions. 6) AN/SLQ-60 Mine Neutralization System (MNS) Seafox on the MCM Class ships. MNS is the replacement to the existing AN/SLQ-48 Mine Neutralization System. 7) SSQ-94 MCM Trainer upgrade will incorporate the AN/SQQ-32 (V)4 sonar, SSN2(V)5 PINS and Mine Neutralization System Team Trainer.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** HFWB/PRODUCT DEVELOPMENT: | 0.312 | 0.000 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>N/A | | | | | |
| ***FY 2019 Base Plans:***<br>N/A | | | | | |
| ***FY 2019 OCO Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>1233 / *Surface MCM Mid-life Upgrade* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2019 funding realigned to PE 0604127N. | | | | | |
| ***Title:*** HFWB/SUPPORT:<br>***Articles:***<br>***FY 2018 Plans:***<br>N/A<br>***FY 2019 Base Plans:***<br>N/A<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2019 funding realigned to PE 0604127N. | 0.150<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- |
| ***Title:*** HFWB/TEST AND EVALUATION:<br>***Articles:***<br>***FY 2018 Plans:***<br>N/A<br>***FY 2019 Base Plans:***<br>N/A<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2019 funding realigned to PE 0604127N. | 0.125<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- |
| ***Title:*** SSQ-94 MCM Trainer Development<br>***Articles:***<br>***FY 2018 Plans:*** | 3.486<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>1233 / *Surface MCM Mid-life Upgrade* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A<br>***FY 2019 Base Plans:***<br>N/A<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2019 funding realigned to PE 0604127N. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 4.073 | 0.000 | 0.000 | 0.000 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • OPN/2622: *Minesweeping System Replacement* | 26.764 | 31.531 | 35.709 | - | 35.709 | 55.949 | 51.338 | 34.007 | 16.753 | Continuing | Continuing |

**Remarks**

The above funding line accounts for several programs, of which the mine sweeping system replacement programs are only a portion.

**D. Acquisition Strategy**

HFWB - Naval Surface Warfare Center, Panama City (NSWC, PC) and ARL UT designed and developed the HFWB upgrade to the AN/SQQ-32.

Mine Warfare and Environmental Decision Aids Library (MEDAL) - requirements for MEDAL Builds are generated through a formal requirements process. Requirements conferences gather a list of candidate functions based on a logical sequence to fully implement the overall software architecture. The fleet is presented with a recommended list of candidate capabilities based on this program plan, doctrine, fleet comments, and technology. These capability items are then prioritized by the fleet representatives (coordinated by Naval Mine Warfare and Anti-Submarine Command (NMAWC).The fleet inputs are then consolidated by COMINEWARCOM into an overall list which is then presented to Navy leadership for pricing and final selection. The selection is based on price, risk, available funding, and possibly by other program factors (e.g., ensure that MEDAL supports other program delivery schedules). Selection balances immediate needs, long term objectives, technical maturity and other programmatic factors. A verification and validation process is applied to any algorithms, tactics, or models to be incorporated in the software. MEDAL development to include integration of data fusion techniques and incorporation of Data Access Layer (DAL) architecture to meet FORCEnet requirements. Acquisition strategy for Mine Countermeasures Commander's Estimate of the situation (MCM CES) is to deliver the software module within MEDAL builds by implementing the CES framework into the MEDAL software. SSQ-94 MCM Trainer upgrade will incorporate the AN/SQQ-32 (V)4 sonar, SSN2(V)5 PINS and Mine Neutralization System Team Trainer.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>1233 / *Surface MCM Mid-life Upgrade* |

**E. Performance Metrics**

SSQ-94 Trainer upgrade completion

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603502N / *Surface & Shallow Water MCM* | Project (Number/Name)<br>1233 / *Surface MCM Mid-life Upgrade* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MNS Development | Various | TBD : TBD | 22.455 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 22.455 | - |
| SSQ-94 Trainer | WR | NSWC, PC : NSWC, PC | 12.858 | 3.486 | Nov 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 16.344 | - |
| BSP: Develop Bottom Sediment Classifier | WR | NRL : WASHINGTON, DC | 0.258 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.258 | - |
| Systems Engineering and Integration | WR | NSWC, PC : PANAMA CITY, FL | 0.306 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.306 | - |
| System Development 1 | WR | NSWC, PC : SAN DIEGO, CA | 0.373 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.373 | - |
| Systems Engineering 2 | WR | NSWC, PC : PANAMA CITY, FL | 2.915 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.915 | - |
| Systems Engineering 3 MCM CES | WR | NSWC, PC : PANAMA CITY, FL | 1.633 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.633 | - |
| HFWB: Primary Hardware Development 1 | C/CPAF | ARL UT : TEXAS | 15.511 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 15.511 | - |
| Primary Hardware Development 2 | WR | ARL-UT : AUSTIN, TX | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | - |
| HFWB: Tow Cable Development | C/CPAF | ARL UT : TEXAS | 1.399 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.399 | - |
| HFWB: Ship Integration | WR | NSWC, PC : PANAMA CITY, FL | 1.697 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.697 | - |
| HFWB: SYSTEM ENGINEER | C/CPAF | ARL UT : TEXAS | 8.753 | 0.312 | May 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 9.065 | - |
| Software Development MEDAL EA | C/CPFF | SAIC : McLean, VA | 41.180 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 41.180 | - |
| | | **Subtotal** | 109.338 | 3.798 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 113.136 | N/A |

**Remarks**

FY 2019 and future funding realigned to PE 0604127N.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603502N / *Surface & Shallow Water MCM* | Project (Number/Name)<br>1233 / *Surface MCM Mid-life Upgrade* | |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Develop Logistics Products | WR | NSWC, PC : PANAMA CITY, FL | 0.243 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.243 | - |
| Software Development 1 | C/CPFF | SAIC : McLean, VA | 0.350 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.350 | - |
| Software Development 2 | C/CPFF | SAIC : McLean, Va | 0.914 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.914 | - |
| HFWB Software Development | C/CPAF | ARL-UT : TEXAS | 8.300 | 0.150 | May 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 8.450 | - |
| HFWB Integrated Logistics Support | WR | NSWC, PC : PANAMA CITY, FL | 2.765 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.765 | - |
| Software Engineering 1 MCM CES | WR | NSWC, PC : PANAMA CITY, FL | 1.517 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.517 | - |
| Software Engineering 2 MEDAL | WR | NSWC, PC : PANAMA CITY, FL | 2.458 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.458 | - |
| | | **Subtotal** | 16.547 | 0.150 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 16.697 | N/A |

**Remarks**

FY 2019 and future funding realigned to PE 0604127N.

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MEDAL Test and Evaluation | C/FP | SAIC : McLean, VA | 7.636 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 7.636 | - |
| MCM CES Test and Evaluation 1 | C/CPAF | VARIOUS : VARIOUS | 1.782 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.782 | - |
| HFWB: Developmental Test and Evaluation | C/CPAF | ARL-UT : TEXAS | 5.800 | 0.125 | May 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 5.925 | - |
| Test and Evaluation 2 | C/CPAF | VARIOUS : VARIOUS | 5.204 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 5.204 | - |
| | | **Subtotal** | 20.422 | 0.125 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 20.547 | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603502N / *Surface & Shallow Water MCM* | Project (Number/Name)<br>1233 / *Surface MCM Mid-life Upgrade* | |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

**Remarks**

FY 2019 and future funding realigned to PE 0604127N.

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management Support 1 | C/CPFF | CACI : WASHINGTON, DC | 0.263 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.263 | - |
| Travel 1 | WR | NAVSEA : WNY, DC | 0.084 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.084 | - |
| Government Engineering Support1 | WR | NSWC, PC : PANAMA CITY, FL | 0.325 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.325 | - |
| MEDAL Program Management Support 2 | Various | VARIOUS : VARIOUS | 2.827 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.827 | - |
| SBIR Assessment 2 | Various | VARIOUS : VARIOUS | 0.019 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.019 | - |
| Program Management Support 3 | C/CPFF | CACI : WASHINGTON, DC | 1.341 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.341 | - |
| Program Management Support 4 | C/CPFF | CACI : WASHINGTON, DC | 0.080 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.080 | - |
| Government Engineering Support3 | WR | NSWC, PC : PANAMA CITY, FL | 0.090 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.090 | - |
| Travel 3 | C/CPAF | NAVSEA : WNY, DC | 0.256 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.256 | - |
| Program Management Support 5 | C/CPFF | CACI : WASHINGTON, DC | 0.167 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.167 | - |
| Government Engineering Support4 | WR | NSWC, PC : PANAMA CITY, FL | 0.010 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.010 | - |
| Travel4 | C/CPAF | NSWC, PC : PANAMA CITY, FL | 0.069 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.069 | - |
| HFWB: Program Management Support 6 | C/CPAF | VARIOUS : VARIOUS | 1.442 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.442 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>1233 / *Surface MCM Mid-life Upgrade* |

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HFWB: Government Engineering Support5 | WR | NSWC, PC : PANAMA CITY, FL | 0.750 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.750 | - |
| HFWB: Travel 5 | C/CPAF | NAVSEA : WNY, DC | 0.080 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.080 | - |
| Government Engineering Support6 | WR | NSWC, PC : PANAMA CITY, FL | 1.352 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.352 | - |
| Travel 6 | C/CPAF | NAVSEA : WNY, DC | 0.238 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.238 | - |
| SBIR Assessment 6 | Various | VARIOUS : VARIOUS | 0.054 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.054 | - |
| Program Management Support 7 | C/CPAF | VARIOUS : VARIOUS | 0.350 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.350 | - |
| Acquisition Workforce Fund | Various | VARIOUS : VARIOUS | 0.122 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.122 | - |
| | | **Subtotal** | 9.919 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 9.919 | N/A |

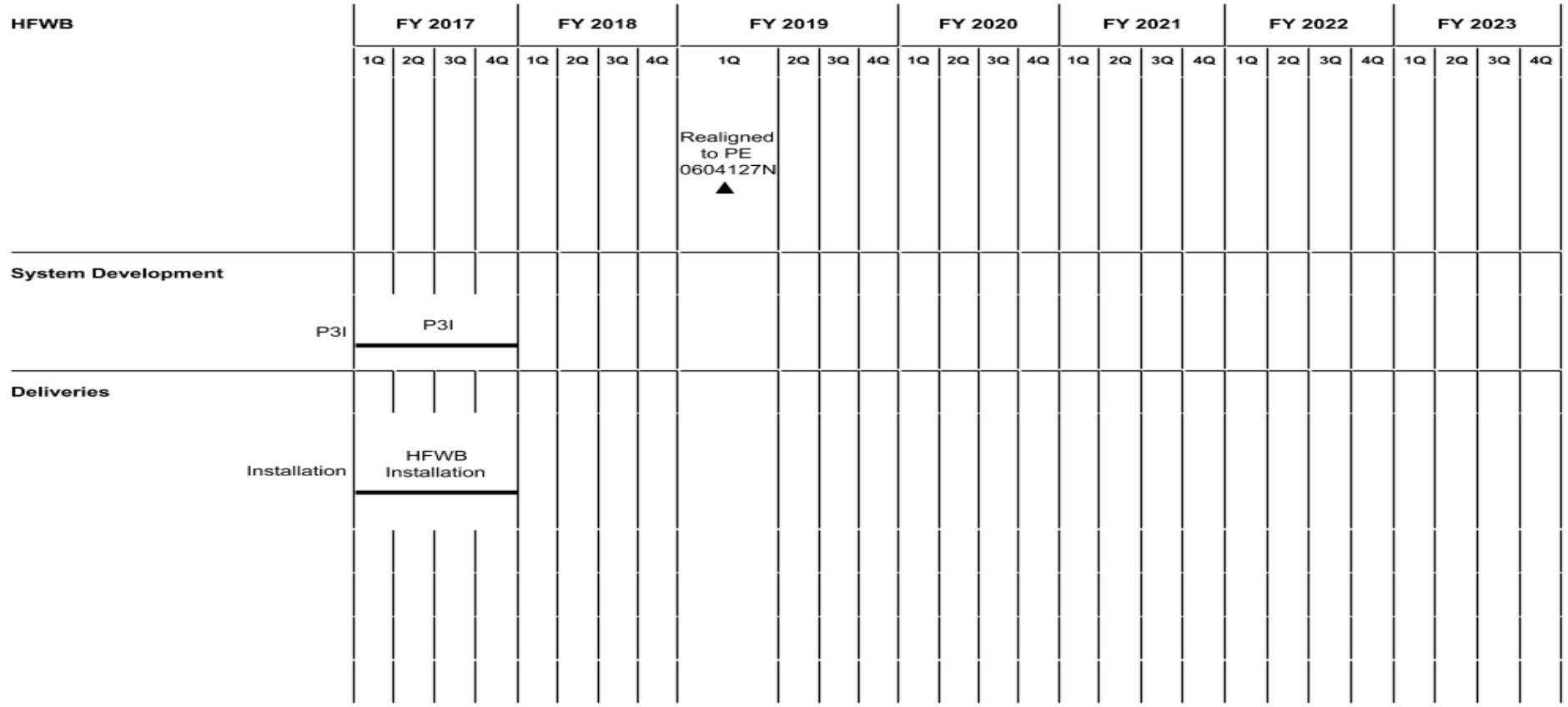
**Remarks**

FY 2019 and future funding realigned to PE 0604127N.

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 156.226 | 4.073 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 160.299 | N/A |

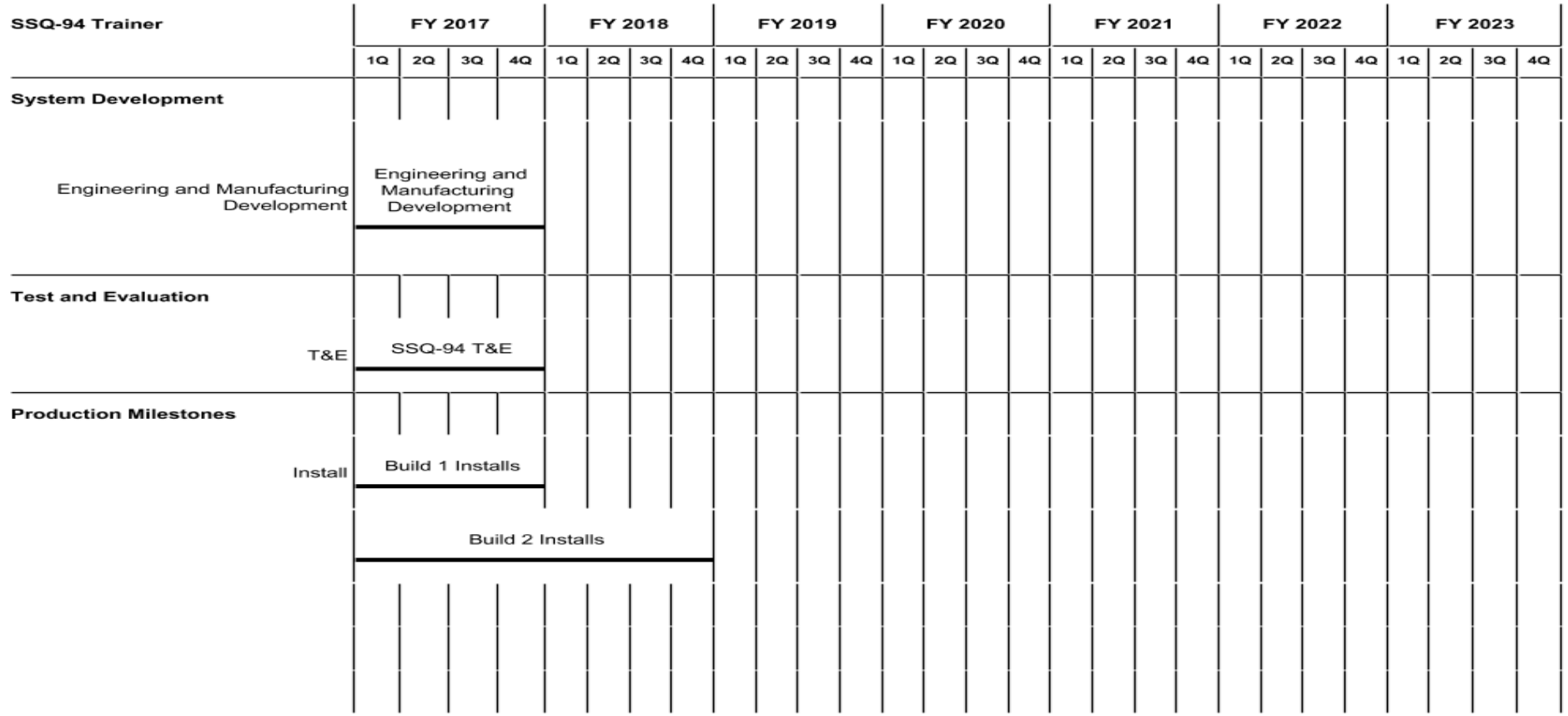
**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>1233 / *Surface MCM Mid-life Upgrade* |




*2019PB - 0603502N - 1233*

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>1233 / *Surface MCM Mid-life Upgrade* |




*2019PB - 0603502N - 1233*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>1233 / *Surface MCM Mid-life Upgrade* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***HFWB*** | | | | |
| Schedule Detail | 1 | 2019 | 1 | 2019 |
| System Development: P3I: P3I Development | 1 | 2017 | 4 | 2017 |
| Deliveries: Installation: Installation | 1 | 2017 | 4 | 2017 |
| ***SSQ-94 Trainer*** | | | | |
| System Development: Engineering and Manufacturing Development: Engineering and Manufacturing Development | 1 | 2017 | 4 | 2017 |
| Test and Evaluation: T&E: T&E | 1 | 2017 | 4 | 2017 |
| Production Milestones: Install: Build 1 Installs | 1 | 2017 | 4 | 2017 |
| Production Milestones: Install: Build 2/3 Installs | 1 | 2017 | 4 | 2018 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603502N / *Surface & Shallow Water MCM* | Project (Number/Name)<br>1234 / *Unmanned Surface Vehicle (USV)* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1234: *Unmanned Surface Vehicle (USV)* | 46.221 | 42.069 | 23.594 | 28.645 | - | 28.645 | 19.915 | 19.167 | 18.993 | 19.404 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

The FY 2019 funding request was reduced by $4.600 million to account for the availability of prior year execution balances.

**A. Mission Description and Budget Item Justification**

This project provides resources for development, improvement and integration of Unmanned Surface Vehicle (USV) Mine Countermeasure systems. A description of the major planned programs include the following:

1) The Unmanned Influence Sweep System (UISS) utilizes an Unmanned Surface Vehicle (USV) integrated with an Unmanned Surface Sweep System (US3), a magnetic/acoustic sweep system developed to sweep acoustic/magnetic influence mines, which can be deployed from the Littoral Combat Ship (LCS) or a Vessel of Opportunity (VOO);

2) MineHunting USVs (MHUs) were delivered in FY14 to 5th Fleet in response to an Urgent Operational Need (UON) from Naval Forces Central Command concerning Mine Countermeasure (MCM) capacity and capability gaps. Four systems (referred to as MHUs 1-4) were provided to Combined Task Force (CTF) 52 to conduct Minehunting Operations.
Each MHU consists of a USMI Naval Special Warfare (NSW) 11-meter Rigid Hull Inflatable Boat (RHIB), which was converted to an Unmanned Surface Vessel by Naval Undersea Warfare Center Division Newport, and tows a Northrop Grumman AQS-24B Minehunting sonar  The systems are controlled from a Command and Control (C2) container located on either an underway host platform or on pier-side.  MHUs 1-4 are currently in sustainment and will support CTF52 until MCM Mission Packages are deployed to C5F AOR.  In FY16-17, Speed to Fleet (S2F) funding supported the design and fabrication of an additional minehunting asset (referred to as "MHU 5") based on the MCM USV craft and integrating the AQS-24B.  Beyond FY17, all future efforts with MHU 5 will be within the MCM USV with Payloads program.

3) The Mine Countermeasures Unmanned Surface Vehicle (MCM USV)[previous term CUSV] with Payloads program leverages the USV from the UISS Program of Record and adds a modular mission capability through the addition of multiple payloads.  MCM USV w/AQS-20C integrates the existing AQS-20C mine-hunting sonar.  MCM USV w/AQS-24B continues the Minehunting efforts of MHU 5.  In FY19 the MCM USV with Payloads program will begin initial design efforts to support integration with a Mine Neutralization capability (Barracuda).  Minesweeping payloads will be subsumed by the MCM USV with Payloads PoR upon the completion of UISS LRIPs.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** UISS Product Development | 9.355 | 0.700 | 1.000 | 0.000 | 1.000 |
| ***Articles:*** | - | - | - | - | - |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>1234 / *Unmanned Surface Vehicle (USV)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***FY 2018 Plans:***<br>Support completion of CT, UISS DT and Operational Assessment (OA) in support of Milestone C in 4QFY2018. During DT, identify any design changes that are needed in support of follow on production efforts. Complete the UISS EDM Technical Data Package (TDP) after completion of UISS EDM Developmental Testing (DT) and Operational Assessment (OA). Evaluate tech refresh product improvements.<br>***FY 2019 Base Plans:***<br>Develop ECPs for EDM and LRIP units. Conduct system engineering efforts in support of program and test efforts.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Funding increase to support ECPs. | | | | | |
| ***Title:*** UISS Support | 1.790 | 0.500 | 1.250 | 0.000 | 1.250 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Engineering, management, and integrated logistics support for Technical Data Package (TDP),conduct Functional Configuration Audit (FCA), and Production Readiness Review (PRR). Support a Milestone C decision in 4Q FY 2018, preparations for IOC in FY19, and start of the development of proposal for Full Rate Production (FRP).<br>***FY 2019 Base Plans:***<br>Engineering, management and logistics support for IOC in 4QFY19, preps for IOT&E and ongoing LRIP efforts. Continue development of FRP documentation to release RFP in late FY19.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2019 funding increase to support IOT&E. | | | | | |
| ***Title:*** UISS Test and Evaluation | 1.781 | 0.974 | 1.625 | 0.000 | 1.625 |
| ***Articles:*** | - | - | - | - | - |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>1234 / *Unmanned Surface Vehicle (USV)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***FY 2018 Plans:***<br>Complete DT and conduct Operational Assessment (OA) of UISS EDM. Conduct LCS integration efforts for risk reduction and system verification (provided LCS ship schedule supports) in preparation for OA.<br>***FY 2019 Base Plans:***<br>Conduct UISS system level IOT&E in support of FRP decision planned for FY20.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Funding increase for IOT&E. | | | | | |
| ***Title:*** UISS Management | 0.355 | 0.120 | 0.131 | 0.000 | 0.131 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Oversee ongoing contractor efforts. Manage efforts to get to Milestone C decision in 4Q FY 2018, start preparations for IOC in<br>FY19, and start of the development of proposal for Full Rate Production (FRP)). Manage award of FY18 Low Rate Initial Production (LRIP) option.<br>***FY 2019 Base Plans:***<br>Oversee ongoing contractor efforts. Manage FRP RFP release and proposal evaluation.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Funding increase to support IOT&E. | | | | | |
| ***Title:*** MHU Product Development | 8.186 | 0.000 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>N/A<br>***FY 2019 Base Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>1234 / *Unmanned Surface Vehicle (USV)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A<br>***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***Title:*** MHU Support<br>***Articles:***<br>***FY 2018 Plans:***<br>Provide program management, engineering and logistics support for product improvements to forward-deployed MHU 1-4 USVs and Command and Control (C2) Station. Tasking will maintain Cybersecurity compliance of system via a software baseline update developed and installed on fielded USVs and C2 container.<br>***FY 2019 Base Plans:***<br>Provide program management, engineering and logistics support for product improvements to forward-deployed MHU 1-4 USVs and Command and Control (C2) Station. Tasking will produce ECPs to implement increased capabilities to meet MCMRON-5 needs during MHU Overhaul, as well as maintain Cybersecurity compliance of system via a software baseline update developed and installed on fielded USVs and C2 container.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Increase due to ECP development | 1.414<br>- | 0.300<br>- | 0.900<br>- | 0.000<br>- | 0.900<br>- |
| ***Title:*** MCM USV w/ Payloads Product Development<br>***Articles:***<br>***FY 2018 Plans:***<br>Complete fabrication of MCM USV crafts and associated sonar D&R systems. Begin system level integration of initial<br>MCM USV w/AQS-20C minehunting sonar. Begin system level integration of initial MCM USV w/AQS-24B minehunting sonar (previously MHU 5). Complete initial design & software development efforts for craft and payload integration, command & control, and operations. Complete fabrication of sonar Deploy and Retrieve systems for MCM USV. Conduct initial system level testing. Prepare to conduct User Operational Evaluation System (UOES) Employment.<br>***FY 2019 Base Plans:*** | 14.900<br>- | 16.900<br>- | 15.039<br>- | 0.000<br>- | 15.039<br>- |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>1234 / *Unmanned Surface Vehicle (USV)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Complete integration of an AQS-20C and AQS-24B with the MCM USV. Deliver MCM USVs (2) w/AQS-20C and AQS-24B to Fleet to begin evaluation of the system as a Minehunting capability within the MCM MP from LCS. Demonstrate system capability from LCS and/or shore operations through User Evaluated Operational System (UOES) Employment. Prepare and support design changes for initial Navy Developmental Testing (DT). Conduct efforts in preparation for start of MCM USV Full Rate Production (FRP) in FY20. Finalize technical data packages for MCM USV and sonar deploy and retrieve systems. Conduct technical feasibility studies, trade study analysis, tactics development, requirements definition and USV impact studies for Mine Neutralization integration with MCM USV. Construct Architecture Framework products, industry requests for information and develop procurement strategy for Mine Neutralization launcher.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Decrease due to transition from fabrication of MCM Craft to integration of sonars with the MCM craft. | | | | | |
| ***Title:*** MCM USV w/ Payloads Support | 4.288 | 3.600 | 4.100 | 0.000 | 4.100 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Continue program management, engineering and technical support for efforts. Provide program management, engineering, logistics, and technical support for system level testing and integration. Review UISS logistics documentation and perform gap analysis to identify changes to logistics documents in order to support MCM USV and Payload integration.<br>***FY 2019 Base Plans:***<br>Continue program management, engineering and technical support for efforts. Support testing and assessment of system capabilities to determine Military utility. Support efforts for FRP preparations. Continue to update MCM USV with payloads logistics documentation and implement changes required to support UOES Employment and MCM MP IOT&E. Procure initial spares for test events. Funding increase due to adding Neutralization efforts.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>1234 / *Unmanned Surface Vehicle (USV)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Increase due to additional support for the UOES Employment | | | | | |
| ***Title:*** MCM USV w/ Payloads Test and Evaluation | 0.000 | 0.250 | 4.350 | 0.000 | 4.350 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Complete contractor initial integration testing of MCM USV w/AQS-24B and MCM USV w/AQS-20C. | | | | | |
| ***FY 2019 Base Plans:***<br>Conduct a UOES test period (for Q-20C and Q-24B) and a Development Testing and Operational Assessment period for the MCM USV w/ AQS-20C sonar in preparation for future MCM MP IOT&E and production decisions. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Increase from FY 2018 to FY 2019 funding for Development Testing and Operational Assessment (DT/OA)in FY19. | | | | | |
| ***Title:*** MCM USV w/ Payloads Management | 0.000 | 0.250 | 0.250 | 0.000 | 0.250 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Provide program planning, management and acquisition document updates for the MCM USV w/Payloads program. | | | | | |
| ***FY 2019 Base Plans:***<br>Provide program planning, management and acquisition document updates for the MCM USV w/Payloads program. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No Change | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 42.069 | 23.594 | 28.645 | 0.000 | 28.645 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>1234 / *Unmanned Surface Vehicle (USV)* |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • 0603596N: *LCS Mission Modules* | 3.300 | 3.900 | 5.000 | - | 5.000 | 1.800 | 0.000 | 0.000 | 0.000 | 0.000 | 64.129 |
| • OPN/1601: *LCS MCM Mission Modules* | 29.724 | 55.870 | 124.147 | - | 124.147 | 204.324 | 245.108 | 227.068 | 234.109 | 1,421.551 | 2,691.282 |

**Remarks**

0603596N RDT&E Funding shown only reflects funding for required UISS development efforts.

OPN/1601 - The above funding line accounts for several programs, of which the Unmanned Surface Vehicle programs are only a portion.

**D. Acquisition Strategy**

UISS - Requirements are documented in the Unmanned Influence Sweep System (UISS) Capability Development Document (CDD) and now have been updated, as needed, in the UISS Capability Production Document (CPD). An Engineering and Manufacturing Development (E&MD) contract was awarded in FY14 with a planned option for Low Rate Initial Production (LRIP) in FY 2018.

**E. Performance Metrics**

UISS - Successfully reach Milestone C in FY 2018

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603502N / *Surface & Shallow Water MCM* | Project (Number/Name)<br>1234 / *Unmanned Surface Vehicle (USV)* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UISS: Product Development | C/CPIF | Textron Systems, Inc : Hunt Valley, MD | 20.538 | 9.355 | Dec 2016 | 0.700 | Jan 2018 | 1.000 | Jan 2019 | - | | 1.000 | Continuing | Continuing | Continuing |
| MHU: Product Development | SS/CPFF | APL JHU : Laurel, MD | 12.015 | 0.200 | Jun 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 12.215 | - |
| MHU: Product Development | C/FPIF | Textron Systems, Inc : Hunt Valley, MD | 0.000 | 7.545 | Mar 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 7.545 | - |
| MHU: Product Development | WR | NSWC PC : Panama City, FL | 0.761 | 0.161 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.922 | - |
| MHU: Product Development | WR | NUWC N : Newport, RI | 0.490 | 0.250 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.740 | - |
| MHU: Product Development | WR | NSWC CD : Bethesda, MD | 0.205 | 0.030 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.235 | - |
| MHU: Product Development | WR | Various : Various | 0.570 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.570 | - |
| MCM USV: Product Development | C/FPIF | Textron Systems, Inc : Hunt Valley, MD | 0.000 | 9.040 | Jan 2017 | 7.900 | Jan 2018 | 3.339 | Jan 2019 | - | | 3.339 | Continuing | Continuing | Continuing |
| MCM USV: Product Development1 | C/CPFF | Textron Systems, Inc : Hunt Valley, MD | 0.000 | 0.000 | | 0.000 | | 3.100 | Jan 2019 | - | | 3.100 | Continuing | Continuing | Continuing |
| MCM USV: Product Development | SS/CPFF | Raytheon : Portsmouth, RI | 0.000 | 3.185 | Jun 2017 | 3.500 | Feb 2018 | 1.975 | Feb 2019 | - | | 1.975 | Continuing | Continuing | Continuing |
| MCM USV: Product Development | SS/CPFF | APL JHU : Laurel, MD | 0.000 | 0.000 | | 0.000 | | 0.750 | Feb 2019 | - | | 0.750 | Continuing | Continuing | Continuing |
| MCM USV: Product Development | WR | NSWC PC : Panama City, FL | 0.000 | 0.925 | Jan 2017 | 3.200 | Jan 2018 | 1.500 | Jan 2019 | - | | 1.500 | Continuing | Continuing | Continuing |
| MCM USV: Product Development | WR | NUWC N : Newport, RI | 0.000 | 0.770 | Jan 2017 | 0.800 | Jan 2018 | 0.725 | Jan 2019 | - | | 0.725 | Continuing | Continuing | Continuing |
| MCM USV: Product Development | WR | NSWC, CD : Bethesda, MD | 0.000 | 0.980 | Jun 2017 | 1.500 | Jan 2018 | 0.950 | Jan 2019 | - | | 0.950 | Continuing | Continuing | Continuing |
| MCM USV: Product Development | C/CPIF | TBD : TBD | 0.000 | 0.000 | | 0.000 | | 2.700 | Apr 2019 | - | | 2.700 | 0.000 | 2.700 | - |
| MCM USV: Product Development | Various | Not Specified : Not Specified | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603502N / *Surface & Shallow Water MCM* | Project (Number/Name)<br>1234 / *Unmanned Surface Vehicle (USV)* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Subtotal** | 34.579 | 32.441 | | 17.600 | | 16.039 | | - | | 16.039 | Continuing | Continuing | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UISS: Engineering Support | WR | NUWC, N : Newport, RI | 0.350 | 0.250 | Dec 2016 | 0.100 | Dec 2017 | 0.250 | Dec 2018 | - | | 0.250 | Continuing | Continuing | Continuing |
| UISS: Engineering Support | WR | NSWC, PC : Panama City, FL | 1.689 | 0.400 | Dec 2016 | 0.100 | Dec 2017 | 0.200 | Dec 2018 | - | | 0.200 | Continuing | Continuing | Continuing |
| UISS: Engineering Support | WR | NSWC, CD : Bethesda, MD | 1.711 | 0.100 | Dec 2016 | 0.000 | | 0.100 | Dec 2018 | - | | 0.100 | Continuing | Continuing | Continuing |
| UISS: Engineering Support | C/CPFF | Textron Systems, Inc : Hunt Valley, MD | 0.670 | 0.500 | Dec 2016 | 0.100 | Jan 2018 | 0.100 | Jan 2019 | - | | 0.100 | Continuing | Continuing | Continuing |
| UISS: Integrated Logistics | WR | NSWC, PC : Panama City, FL | 0.290 | 0.200 | Dec 2016 | 0.050 | Dec 2017 | 0.200 | Dec 2018 | - | | 0.200 | Continuing | Continuing | Continuing |
| UISS: Integrated Logistics | WR | NSWC, CD : Bethesda, MD | 0.611 | 0.140 | Dec 2016 | 0.050 | Dec 2017 | 0.200 | Dec 2018 | - | | 0.200 | Continuing | Continuing | Continuing |
| UISS: Integrated Logistics | C/CPFF | Textron Systems, Inc : Hunt Valley, MD | 0.728 | 0.200 | Dec 2016 | 0.100 | Dec 2017 | 0.200 | Dec 2018 | - | | 0.200 | Continuing | Continuing | Continuing |
| MHU: Engineering Support | WR | SSC, PAC : San Diego, CA | 0.260 | 0.050 | Dec 2016 | 0.030 | Dec 2017 | 0.030 | Dec 2018 | - | | 0.030 | Continuing | Continuing | Continuing |
| MHU: Engineering Support | WR | NSWC, PC : Panama City, FL | 0.360 | 0.457 | Dec 2016 | 0.120 | Feb 2018 | 0.840 | Feb 2019 | - | | 0.840 | Continuing | Continuing | Continuing |
| MHU: Engineering Support | WR | NUWC, N : Newport, RI | 0.260 | 0.477 | Dec 2016 | 0.120 | Mar 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.857 | - |
| MHU: Engineering Support | WR | NSWC, CD : Bethesda, MD | 0.160 | 0.090 | Dec 2016 | 0.030 | Dec 2017 | 0.030 | Dec 2018 | - | | 0.030 | Continuing | Continuing | Continuing |
| MHU: Engineering Support | WR | Various : Various | 0.180 | 0.340 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.520 | - |
| MCM USV: Engineering Support | WR | NSWC, PC : Panama City, FL | 0.000 | 2.458 | Jan 2017 | 1.400 | Jan 2018 | 1.400 | Jan 2019 | - | | 1.400 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603502N / *Surface & Shallow Water MCM* | Project (Number/Name)<br>1234 / *Unmanned Surface Vehicle (USV)* | |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MCM USV: Engineering Support | WR | NUWC, N : Newport, RI | 0.000 | 1.830 | Jan 2017 | 1.200 | Jan 2018 | 0.800 | Jan 2019 | - | | 0.800 | Continuing | Continuing | Continuing |
| MCM USV: Engineering Support | C/CPFF | Textron Systems, Inc : Hunt Valley, MD | 0.000 | 0.000 | | 0.500 | Jan 2018 | 0.215 | Jan 2019 | - | | 0.215 | Continuing | Continuing | Continuing |
| MCM USV: Integrated Logistics | SS/CPFF | Raytheon : Portsmouth, RI | 0.000 | 0.000 | | 0.000 | | 0.400 | Jan 2019 | - | | 0.400 | Continuing | Continuing | Continuing |
| MCM USV: Integrated Logistics | SS/CPFF | Northrup Grumman : Annapolis, MD | 0.000 | 0.000 | | 0.000 | | 0.300 | Mar 2019 | - | | 0.300 | Continuing | Continuing | Continuing |
| MCM USV: Integrated Logistics | C/CPFF | Textron Systems, Inc : Hunt Valley, MD | 0.000 | 0.000 | | 0.500 | Jan 2018 | 0.985 | Feb 2019 | - | | 0.985 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 7.269 | 7.492 | | 4.400 | | 6.250 | | - | | 6.250 | Continuing | Continuing | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UISS: Test and Evaluation | WR | NSWC, PC : Panama City, FL | 0.430 | 0.600 | Dec 2016 | 0.200 | Dec 2017 | 1.050 | Dec 2018 | - | | 1.050 | Continuing | Continuing | Continuing |
| UISS: Test and Evaluation | WR | NSWC, CD : Bethesda, MD | 0.650 | 0.681 | Dec 2016 | 0.500 | Dec 2017 | 0.400 | Dec 2018 | - | | 0.400 | Continuing | Continuing | Continuing |
| UISS: Test and Evaluation | C/CPIF | Textron Systems, Inc : Hunt Valley, MD | 1.209 | 0.500 | Dec 2016 | 0.274 | Dec 2017 | 0.175 | Dec 2018 | - | | 0.175 | Continuing | Continuing | Continuing |
| MCM USV: Test and Evaluation | WR | NSWC, PC : Panama City, FL | 0.000 | 0.000 | | 0.150 | Jun 2018 | 2.200 | Mar 2019 | - | | 2.200 | Continuing | Continuing | Continuing |
| MCM USV: Test and Evaluation | WR | NSWC, CD : Bethesda, MD | 0.000 | 0.000 | | 0.100 | Jun 2018 | 0.250 | Mar 2019 | - | | 0.250 | Continuing | Continuing | Continuing |
| MCM USV: Test and Evaluation | SS/CPFF | Raytheon : Portsmouth, RI | 0.000 | 0.000 | | 0.000 | | 0.400 | Mar 2019 | - | | 0.400 | Continuing | Continuing | Continuing |
| MCM USV: Test and Evaluation | C/CPFF | Textron Systems, Inc : Hunt Valley, MD | 0.000 | 0.000 | | 0.000 | | 1.500 | Mar 2019 | - | | 1.500 | 0.000 | 1.500 | - |
| Need Item Text | C/BA | Not Specified : Not Specified | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>1234 / *Unmanned Surface Vehicle (USV)* |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Subtotal** | 2.289 | 1.781 | | 1.224 | | 5.975 | | - | | 5.975 | Continuing | Continuing | N/A |

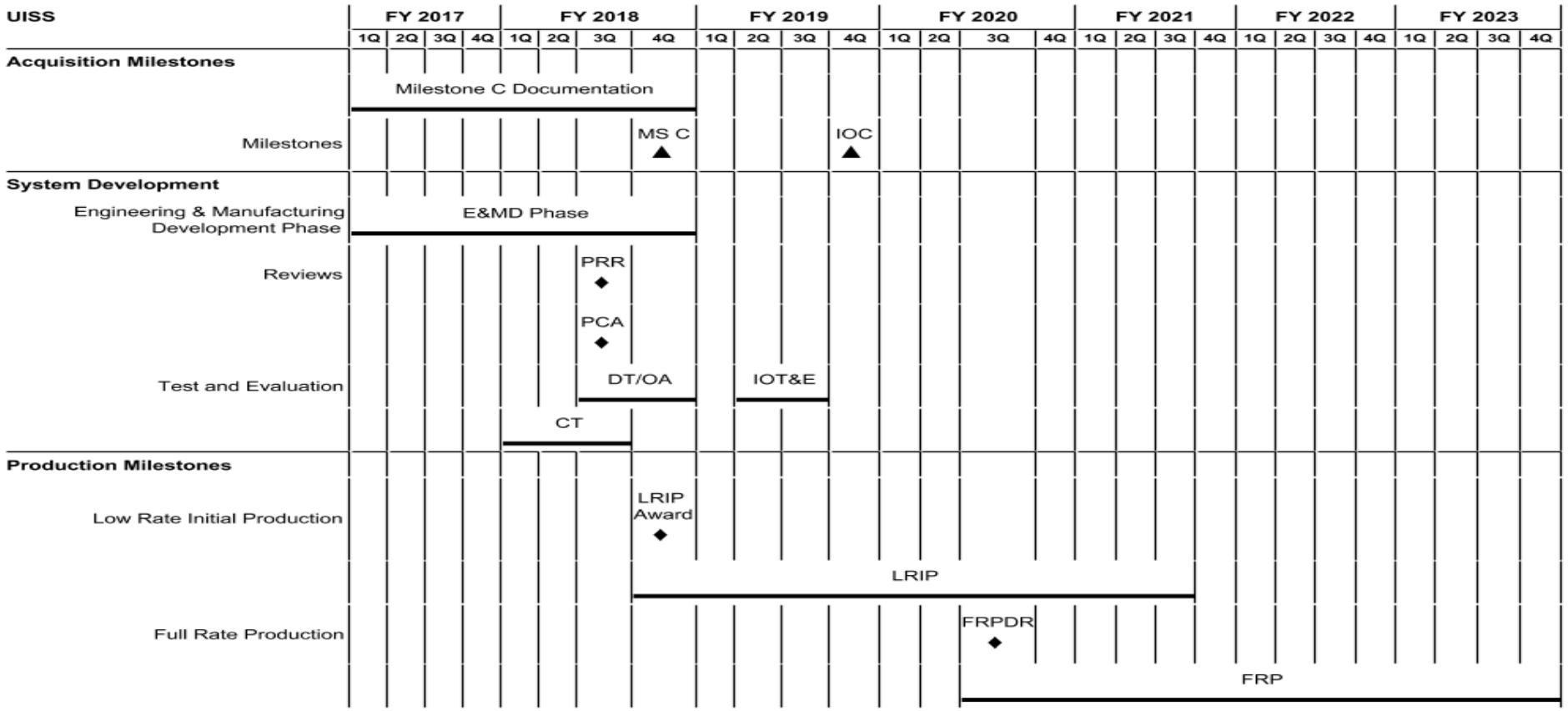
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UISS: Travel | WR | NAVSEA : Washington, DC | 0.200 | 0.075 | Jun 2017 | 0.020 | Jan 2018 | 0.020 | Jan 2019 | - | | 0.020 | Continuing | Continuing | Continuing |
| UISS: Management | C/CPAF | TBD : TBD | 1.884 | 0.280 | Dec 2016 | 0.100 | Nov 2017 | 0.111 | Nov 2018 | - | | 0.111 | Continuing | Continuing | Continuing |
| MCM USV: Travel | WR | NAVSEA : Washington, DC | 0.000 | 0.000 | | 0.100 | Jan 2018 | 0.100 | Jan 2019 | - | | 0.100 | Continuing | Continuing | Continuing |
| MCM USV: Management | C/CPAF | TBD : TBD | 0.000 | 0.000 | | 0.150 | Nov 2017 | 0.150 | Nov 2018 | - | | 0.150 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 2.084 | 0.355 | | 0.370 | | 0.381 | | - | | 0.381 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 46.221 | 42.069 | | 23.594 | | 28.645 | | - | | 28.645 | Continuing | Continuing | N/A |

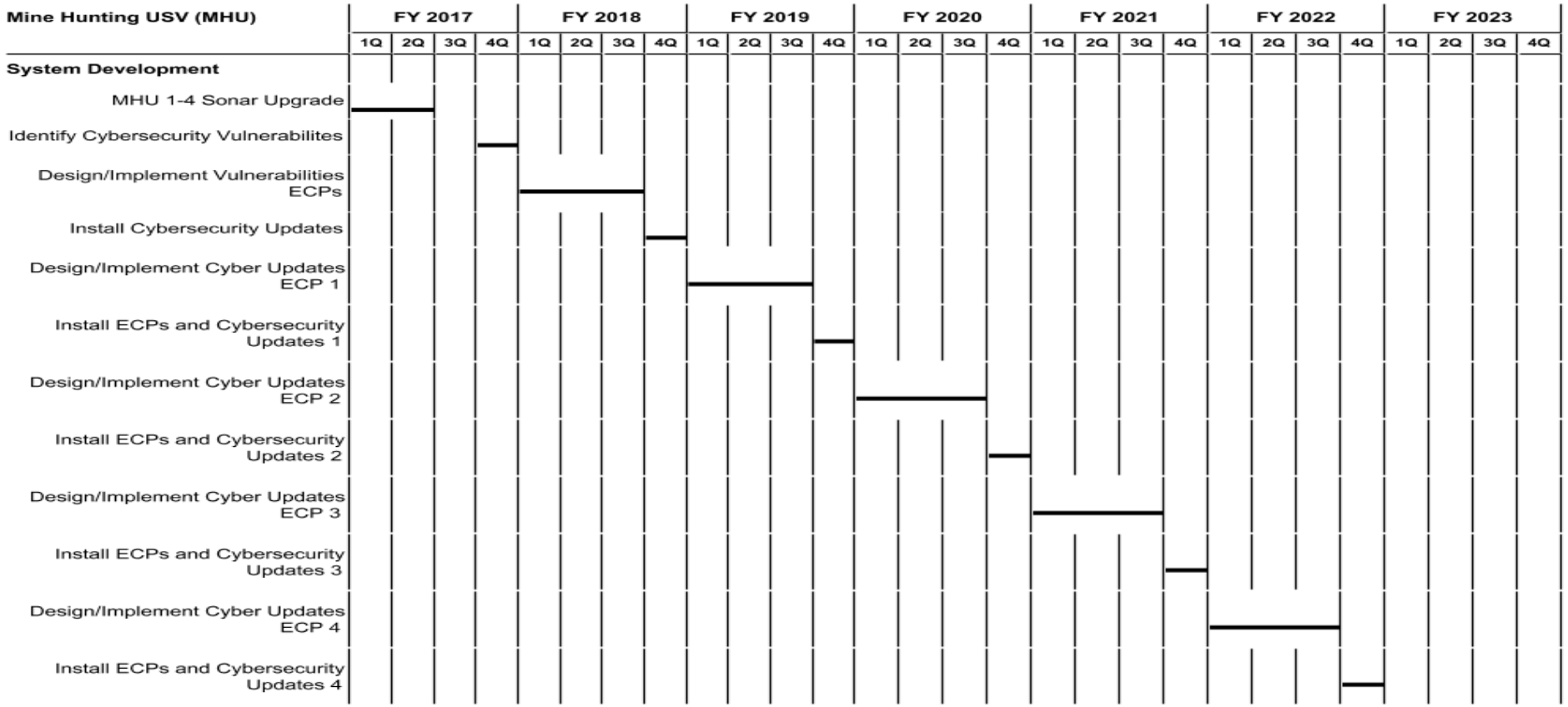
**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>1234 / *Unmanned Surface Vehicle (USV)* |



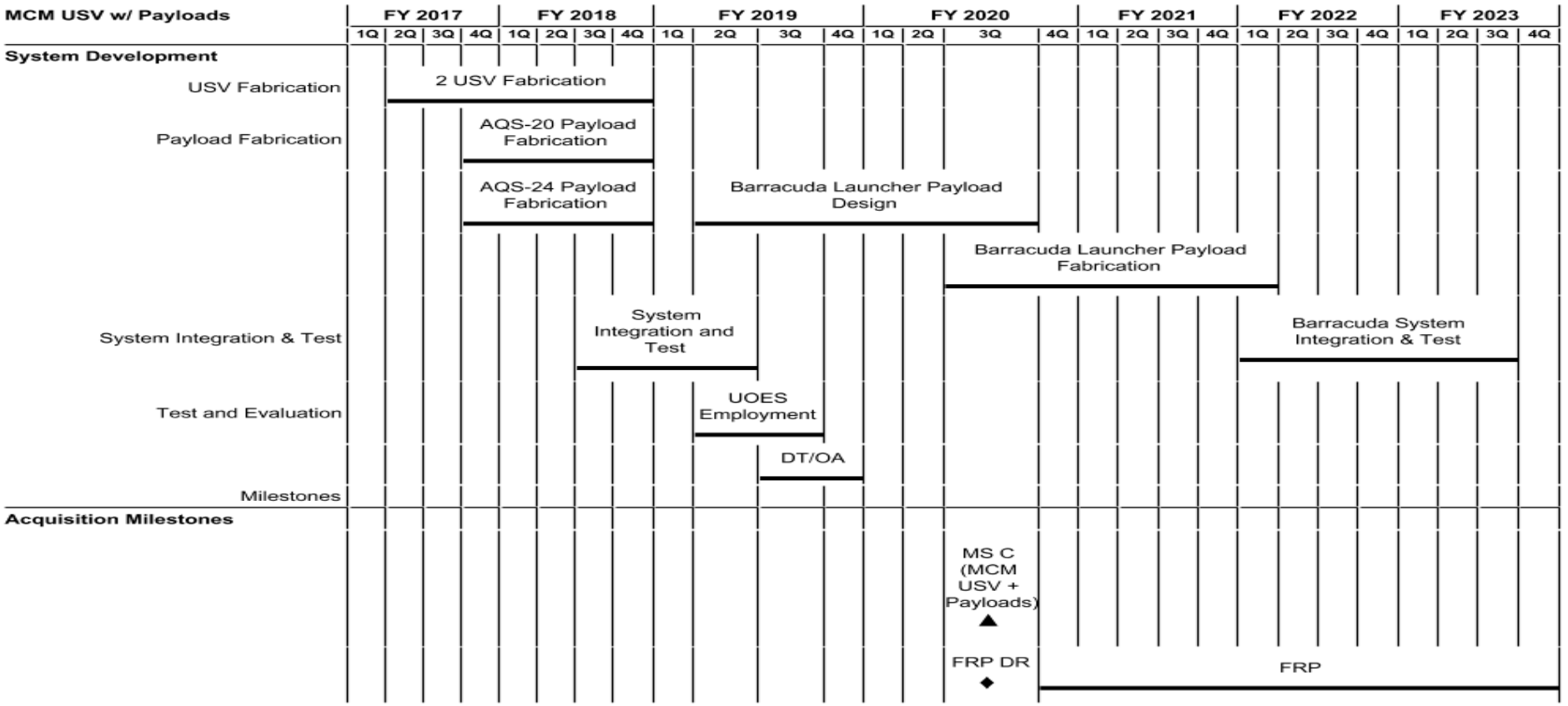

*2019PB - 0603502N - 1234*

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>1234 / *Unmanned Surface Vehicle (USV)* |




*2019PB - 0603502N - 1234*

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>1234 / *Unmanned Surface Vehicle (USV)* |




*2019PB - 0603502N - 1234*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>1234 / *Unmanned Surface Vehicle (USV)* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***UISS*** | | | | |
| Acquisition Milestones: Milestone C Documentation | 1 | 2017 | 4 | 2018 |
| Acquisition Milestones: Milestones: Milestone C | 4 | 2018 | 4 | 2018 |
| Acquisition Milestones: Milestones: Initial Operational Capability | 4 | 2019 | 4 | 2019 |
| System Development: Engineering & Manufacturing Development Phase: Engineering & Manufacturing Development Phase | 1 | 2017 | 4 | 2018 |
| System Development: Reviews: Production Readiness Review (PRR) | 3 | 2018 | 3 | 2018 |
| System Development: Reviews: Physical Configuration Audit (PCA) | 3 | 2018 | 3 | 2018 |
| System Development: Test and Evaluation: DT Testing | 3 | 2018 | 4 | 2018 |
| System Development: Test and Evaluation: Initial Operational Test & Evaluation | 2 | 2019 | 3 | 2019 |
| System Development: Test and Evaluation: Contractor Testing | 1 | 2018 | 3 | 2018 |
| Production Milestones: Low Rate Initial Production: LRIP Contract Award | 4 | 2018 | 4 | 2018 |
| Production Milestones: Low Rate Initial Production: LRIP phase | 4 | 2018 | 3 | 2021 |
| Production Milestones: Full Rate Production: Full Rate Production Decision Review | 3 | 2020 | 3 | 2020 |
| Production Milestones: Full Rate Production: Full Rate Production | 3 | 2020 | 4 | 2023 |
| ***Mine Hunting USV (MHU)*** | | | | |
| System Development: MHU 1-4 Sonar Upgrade: | 1 | 2017 | 2 | 2017 |
| System Development: Identify Cybersecurity Vulnerabilites: | 4 | 2017 | 4 | 2017 |
| System Development: Design/Implement Vulnerabilities ECPs: | 1 | 2018 | 3 | 2018 |
| System Development: Install Cybersecurity Updates: | 4 | 2018 | 4 | 2018 |
| System Development: Design/Implement Cyber Updates ECP 1: | 1 | 2019 | 3 | 2019 |
| System Development: Install ECPs and Cybersecurity Updates 1: | 4 | 2019 | 4 | 2019 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>1234 / *Unmanned Surface Vehicle (USV)* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| System Development: Design/Implement Cyber Updates ECP 2: | 1 | 2020 | 3 | 2020 |
| System Development: Install ECPs and Cybersecurity Updates 2: | 4 | 2020 | 4 | 2020 |
| System Development: Design/Implement Cyber Updates ECP 3: | 1 | 2021 | 3 | 2021 |
| System Development: Install ECPs and Cybersecurity Updates 3: | 4 | 2021 | 4 | 2021 |
| System Development: Design/Implement Cyber Updates ECP 4: | 1 | 2022 | 3 | 2022 |
| System Development: Install ECPs and Cybersecurity Updates 4: | 4 | 2022 | 4 | 2022 |
| ***MCM USV w/ Payloads*** | | | | |
| System Development: USV Fabrication: 2 USV Fabrication | 2 | 2017 | 4 | 2018 |
| System Development: Payload Fabrication: AQS-20 Payload Fabrication | 4 | 2017 | 4 | 2018 |
| System Development: Payload Fabrication: AQS-24 Payload Fabrication | 4 | 2017 | 4 | 2018 |
| System Development: Payload Fabrication: Barracuda Launcher Payload Design | 2 | 2019 | 3 | 2020 |
| System Development: Payload Fabrication: Barracuda Launcher Payload Fabrication | 3 | 2020 | 1 | 2022 |
| System Development: System Integration & Test: System Integration and Test | 3 | 2018 | 2 | 2019 |
| System Development: System Integration & Test: Barracuda System Integration & Test | 1 | 2022 | 3 | 2023 |
| System Development: Test and Evaluation: UOES Employment | 2 | 2019 | 3 | 2019 |
| System Development: Test and Evaluation: Development Test/Operational Assessment | 3 | 2019 | 4 | 2019 |
| Acquisition Milestones: Milestone C (MCM USV + Payloads) | 3 | 2020 | 3 | 2020 |
| Acquisition Milestones: Full Rate Production Decision Review | 3 | 2020 | 3 | 2020 |
| Acquisition Milestones: Full Rate Production | 4 | 2020 | 4 | 2023 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603502N / *Surface & Shallow Water MCM* | Project (Number/Name)<br>1235 / *Mine Warfare Planning and Analysis* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1235: *Mine Warfare Planning and Analysis* | 7.520 | 8.664 | 3.139 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 19.323 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

FY 2019 and future funding for Project 1235 is in Program Element (PE) 0604127N. Project realigned from PE 0603502N starting in FY 2019.

**A. Mission Description and Budget Item Justification**

Mine Warfare and Environmental Decision Aids Library (MEDAL) is a software segment on the Global Command and Control System - Maritime (GCCS-M). MEDAL provides mine and mine warfare planning and evaluation tools and databases to the MCM Commander.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** MEDAL Product Development | 4.114 | 1.433 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>MINEnet Tactical v1.3 development to include Minefield Planning and JABS initial capabilities and COBRA updates. Update MEDAL EA course curriculum for MINEnet Tactical 1.3.<br>***FY 2019 Base Plans:***<br>Funding has been realigned to PE 0604127N.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Funding has been realigned to PE 0604127N. | | | | | |
| ***Title:*** MEDAL Support | 2.945 | 0.423 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Initiate the development of MEDAL EA MINEnet Tactical v1.3 with reduced set of capability upgrades. Provide technical integration of developed algorithms and models that have demonstrated their effectiveness with respect to their objectives. Support efforts to include communication with activities such as applied labs, | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>1235 / *Mine Warfare Planning and Analysis* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| government activities, and designated contractors. Assist in providing the speed, agility, adaptability, and flexibility required for modern MCM operations. Begin fielding MINEnet Tactical v1.2.2<br>***FY 2019 Base Plans:***<br>Funding has been realigned to PE 0604127N.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Funding has been realigned to PE 0604127N. | | | | | |
| ***Title:*** MEDAL Test and Evaluation<br>***Articles:***<br>***FY 2018 Plans:***<br>MEDAL EA v1.2.2 - Conduct series of Development Tests (DTs) and a series of regression tests. Continue System Development testing activities with multiple platforms including LCS MCM MPAS, ISNS, CANES and ONENET integration tests. Continue Cybersecurity patching and assessments. Deliver to Fleet in accordance with the MEDAL EA Fielding Plan.<br>***FY 2019 Base Plans:***<br>Funding has been realigned to PE 0604127N.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Funding has been realigned to PE 0604127N. | 0.897<br>- | 0.675<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- |
| ***Title:*** MEDAL Management<br>***Articles:***<br>***FY 2018 Plans:***<br>Continue to provide program management support and travel for MEDAL program. Program management shall include overall technical guidance and leadership for the program. Oversight of financial and logistics efforts and coordination with Navy and other DoD organizations and contractors as required to ensure successful execution of the program. As part of the systems engineering element of PM, communicate and coordinate with MIW C4ISR, ICWS, Organic MCM, Mainstreaming MIEW, Expeditionary Warfare C4ISR, tactics development, | 0.708<br>- | 0.608<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>1235 / *Mine Warfare Planning and Analysis* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| long term planning, Naval Special Clearance Team (NSCT-1) Assault Breaching System (ABS), LCS, and other programs as they relate to MEDAL and MIW Mission Planning, Evaluation, and C4ISR. Other PM tasking to include briefings, demonstrations, and project planning as required.<br>***FY 2019 Base Plans:***<br>Funding has been realigned to PE 0604127N.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Funding has been realigned to PE 0604127N. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 8.664 | 3.139 | 0.000 | 0.000 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • 2622/LV075: *Mine Sweeping Replacement (MEDAL).* | 2.358 | 3.585 | 1.111 | - | 1.111 | 0.799 | 0.889 | 0.891 | 0.900 | 0.000 | 16.356 |

**Remarks**

**D. Acquisition Strategy**

Mine Warfare and Environmental Decision Aids Library (MEDAL) - requirements for MEDAL Builds are generated through a formal requirements process. Requirements conferences gather a list of candidate functions based on a logical sequence to fully implement the overall software architecture. The fleet is presented with a recommended list of candidate capabilities based on this program plan, doctrine, fleet comments, and technology. These capability items are then prioritized by the fleet representatives (coordinated by Naval Surface and Mine War-fighting Development Center (SMWDC). The fleet inputs are then consolidated by COMINEWARCOM into an overall list which is then presented to Navy leadership for pricing and final selection. The selection is based on price, risk, available funding, and possibly by other program factors (e.g., ensure that MEDAL supports other program delivery schedules). Selection balances immediate needs, long term objectives, technical maturity and other programmatic factors. A verification and validation process is applied to any algorithms, tactics, or models to be incorporated in the software.

**E. Performance Metrics**

Mine Warfare and Environmental Decision Aids Library (MEDAL) development to include integration of data fusion techniques and incorporation of Data Access Layer (DAL) architecture to meet FORCEnet requirements.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>1235 / *Mine Warfare Planning and Analysis* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MEDAL EA | C/CPAF | SAIC : McLean, VA | 4.464 | 4.114 | Oct 2016 | 1.433 | Oct 2017 | 0.000 | | - | | 0.000 | 0.000 | 10.011 | - |
| | | **Subtotal** | 4.464 | 4.114 | | 1.433 | | 0.000 | | - | | 0.000 | 0.000 | 10.011 | N/A |

**Remarks**

FY 2019 and future funding realigned to PE 0604127N.

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MEDAL EA | WR | NSWC PC : Panama City FL | 0.247 | 2.945 | Nov 2016 | 0.423 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 3.615 | - |
| | | **Subtotal** | 0.247 | 2.945 | | 0.423 | | 0.000 | | - | | 0.000 | 0.000 | 3.615 | N/A |

**Remarks**

FY 2019 and future funding realigned to PE 0604127N.

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MEDAL EA | C/CPAF | SAIC : McLean, VA | 2.398 | 0.897 | Oct 2016 | 0.675 | Oct 2017 | 0.000 | | - | | 0.000 | 0.000 | 3.970 | - |
| | | **Subtotal** | 2.398 | 0.897 | | 0.675 | | 0.000 | | - | | 0.000 | 0.000 | 3.970 | N/A |

**Remarks**

FY 2019 and future funding realigned to PE 0604127N.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603502N / *Surface & Shallow Water MCM* | Project (Number/Name)<br>1235 / *Mine Warfare Planning and Analysis* | |

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MEDAL EA | WR | NSWC PC : Panama City Fl | 0.411 | 0.708 | Nov 2016 | 0.608 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 1.727 | - |
| | | **Subtotal** | 0.411 | 0.708 | | 0.608 | | 0.000 | | - | | 0.000 | 0.000 | 1.727 | N/A |

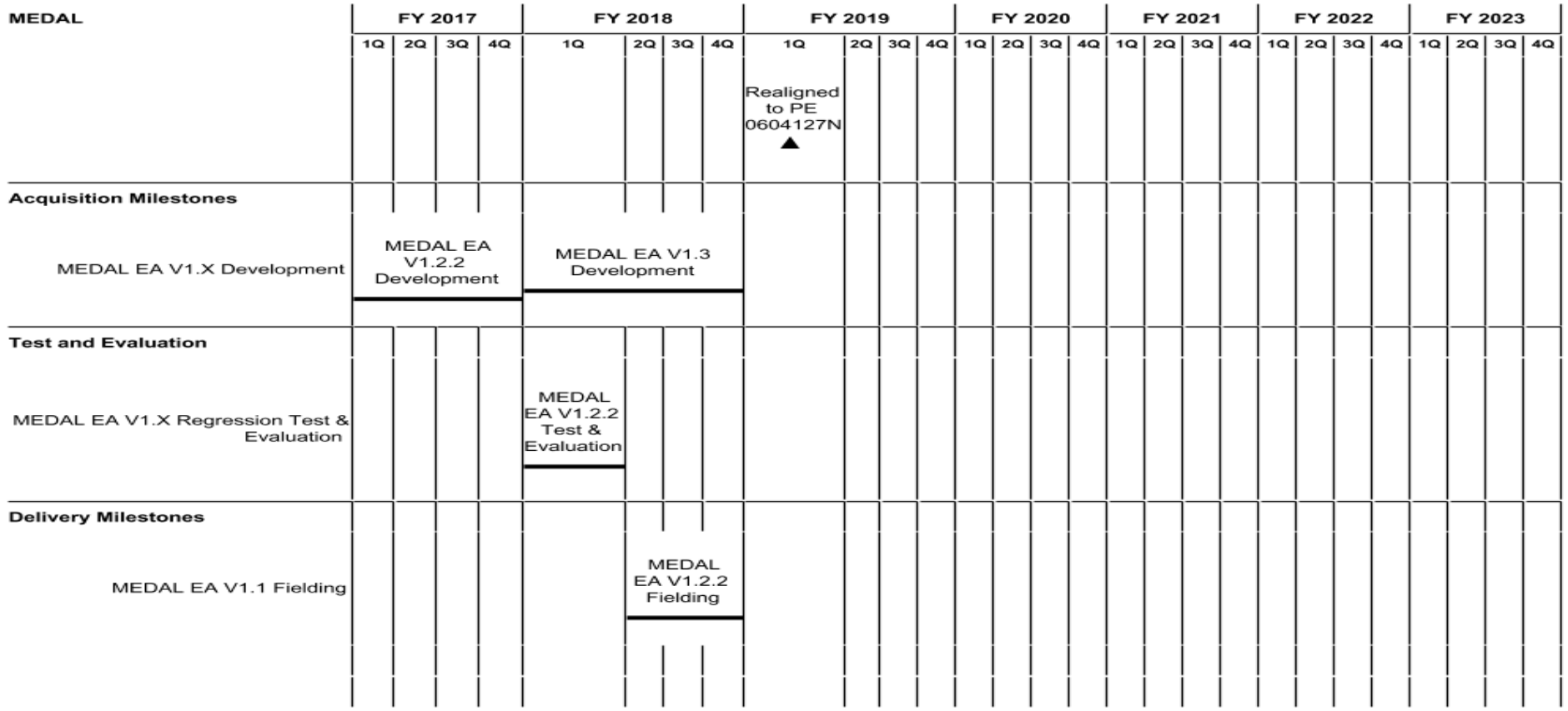
**Remarks**

FY 2019 and future funding realigned to PE 0604127N.

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 7.520 | 8.664 | | 3.139 | | 0.000 | | - | | 0.000 | 0.000 | 19.323 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>1235 / *Mine Warfare Planning and Analysis* |




*2019PB - 0603502N - 1235*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>1235 / *Mine Warfare Planning and Analysis* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***MEDAL*** | | | | |
| Schedule Detail | 1 | 2019 | 1 | 2019 |
| Acquisition Milestones: MEDAL EA V1.X Development: MEDAL EA V1.2 Development | 1 | 2017 | 4 | 2017 |
| Acquisition Milestones: MEDAL EA V1.X Development: MEDAL EA V1.3X Development | 1 | 2018 | 4 | 2018 |
| Test and Evaluation: MEDAL EA V1.X Regression Test & Evaluation: MEDAL EA V1. 2X Test & Evaluation | 1 | 2018 | 1 | 2018 |
| Delivery Milestones: MEDAL EA V1.1 Fielding: MEDAL EA V1.2 Fielding | 2 | 2018 | 4 | 2018 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603502N / *Surface & Shallow Water MCM* | Project (Number/Name)<br>2094 / *Unmanned Underwater Vehicle* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2094: *Unmanned Underwater Vehicle* | 64.860 | 21.945 | 60.187 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 146.992 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

FY 2019 and future funding for Project 2094 is in Program Element (PE) 0604031N. Project realigned from PE 0603502N starting in FY 2019.

**A. Mission Description and Budget Item Justification**

In order to accelerate future capability and support steady growth of the fleet's UUV Family of Systems (FoS) the Snakehead Large Displacement Unmanned Undersea Vehicle (LDUUV) program will design and build a modular, reconfigurable Unmanned Undersea Vehicle (UUV) with Open Architecture (OA) software (SW) focused on introducing a new class (large displacement) of UUVs to the Navy to provide increased endurance, payload hosting, and delivery capability.
The Snakehead LDUUV will be modular in design and include hotel functionality (guidance and control, navigation, autonomy, situational awareness, core communications, and power distribution), energy and power, propulsion and maneuvering, mission sensors, and communications links. It is intended that modules will have well defined interfaces for the purposes of implementing cost-effective upgrades in future increments to leverage advances in technology. The Snakehead LDUUV is a CNO/ASN(RDA) approved Accelerated Acquisition phased approach to build capabilities at a manageable level of risk in the Navy's class of Large Displacement Unmanned Undersea Vehicles. It consists of two phases of government-led development with significant industry involvement transitioning to industry production of the full vehicles.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** LDUUV Product Development | 17.440 | 51.838 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Conduct detailed design for two Phase I LDUUVs, and prepare for Critical Design Review (CDR). Procure remaining<br>LLTM (rest of hull, sensors, batteries, etc.).<br><br>Continue Industry supported experimentation with autonomy sense and avoidance, Intelligence Preparation of Operational<br>Environment (IPOE) demonstrations, and propulsion, navigation, communications, launch and recovery experimentation to | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>2094 / *Unmanned Underwater Vehicle* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| reduce risk with submarine and surface ship integration.<br>***FY 2019 Base Plans:***<br>FY 2019 funding in Program Element (PE) 0604031N.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Project realigned to PE 0604031N from PE 0603502N starting in FY 2019. | | | | | |
| ***Title:*** LDUUV Support | 2.832 | 6.662 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Complete initial development of documentation and drawings, Submarine Interface Control documents, System Hazard Analysis, Master System Test and Evaluation Plan (MSTEP); work on required documentation for detailed design and critical design review. Continue supportability analysis. Support demonstration exercises. Ramp up due to larger efforts<br>as part of detailed design.<br>***FY 2019 Base Plans:***<br>FY 2019 funding in Program Element (PE) 0604031N.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Project realigned to PE 0604031N from PE 0603502N starting in FY 2019. | | | | | |
| ***Title:*** LDUUV Management | 1.673 | 1.687 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Provide program management support and travel for the LDUUV program. Program management plans include overall technical guidance and leadership for the program. Oversight of financial and logistics efforts and | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>2094 / *Unmanned Underwater Vehicle* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| coordination with Navy and other DoD organizations and contractors as required to ensure successful execution of the program.<br>***FY 2019 Base Plans:***<br>FY 2019 funding in Program Element (PE) 0604031N.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Project realigned to PE 0604031N from PE 0603502N starting in FY 2019. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 21.945 | 60.187 | 0.000 | 0.000 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • 0604031N/2094: *Unmanned Undersea Vehicles* | 0.000 | 0.000 | 92.613 | - | 92.613 | 135.641 | 136.136 | 121.836 | 129.429 | Continuing | Continuing |

**Remarks**

Funding moved to new Program Element in FY2019

**D. Acquisition Strategy**

Utilizing Navy requirements to insert incremental capability, the LDUUV program will design, build, and test risk-reducing UUVs in two phases followed by competitive award of a production contract.

**E. Performance Metrics**

LDUUV - Completed Preliminary Design Review (PDR) 4Q FY17
LDUUV - Complete Critical Design Review (CDR) 1Q FY19

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>2094 / *Unmanned Underwater Vehicle* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDUUV Vehicles, Hardware, & Design | WR | NUWC Newport : Newport, RI | 6.604 | 6.070 | Dec 2016 | 9.127 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 21.801 | - |
| LDUUV Vehicles, Hardware, & Design | C/CPFF | Various : Various | 13.299 | 2.100 | Feb 2017 | 27.871 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 43.270 | - |
| LDUUV Vehicles, Hardware, & Design | WR | NSWC Carderock : Carderock, MD | 1.705 | 2.805 | Dec 2016 | 2.920 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 7.430 | - |
| LDUUV Vehicles, Hardware, & Design | WR | NSWC PCD : Panama City, FL | 0.400 | 0.120 | Dec 2016 | 0.166 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.686 | - |
| LDUUV Vehicles, Hardware, & Design | SS/CPFF | ARL PSU : State College, PA | 0.907 | 4.170 | Jan 2017 | 6.176 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 11.253 | - |
| LDUUV Vehicles, Hardware, & Design | SS/CPFF | APL/JHU : Laurel, MD | 0.988 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.988 | - |
| LDUUV Vehicles, Hardware, & Design | WR | SSC Pacific : San Diego, CA | 0.455 | 0.215 | Jan 2017 | 0.423 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 1.093 | - |
| LDUUV Vehicles, Hardware, & Design | WR | NUWC KPT : Keyport, WA | 0.075 | 1.750 | Jan 2017 | 4.391 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 6.216 | - |
| LDUUV Risk Reduction Sonar | C/CPFF | ARL UT : Austin, TX | 0.228 | 0.000 | Jan 2017 | 0.551 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.779 | - |
| LDUUV Experimentation and Risk Reduction - Battery Certification | WR | NSWC Crane : Crane IN | 0.925 | 0.210 | Dec 2016 | 0.213 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 1.348 | - |
| LDUUV Platform Integration | Various | VAR : VAR | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | - |
| | | **Subtotal** | 25.586 | 17.440 | | 51.838 | | 0.000 | | - | | 0.000 | 0.000 | 94.864 | N/A |

**Remarks**

FY 2019 and future funding for Project 2094 is in Program Element (PE) 0604031N.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>2094 / *Unmanned Underwater Vehicle* |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDUUV ILS & Engineering Support | Various | VAR : VAR | 17.768 | 0.250 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 18.018 | - |
| PLUS ILS & Engineering Support | Various | VAR : VAR | 8.321 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 8.321 | - |
| LDUUV Engineering Support | WR | NUWC Newport : Newport, RI | 1.079 | 0.723 | Dec 2016 | 4.452 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 6.254 | - |
| LDUUV Launch and Recovery Engineering Support | WR | NSWC PCD : Panama City, FL | 0.000 | 0.260 | Dec 2016 | 0.306 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.566 | - |
| LDUUV Hydrodynamics and Propulsion Engineering Support | C/CPFF | VAR : VAR | 0.295 | 0.701 | Feb 2017 | 0.450 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 1.446 | - |
| LDUUV Hull and Propulsion Engineering Support | WR | NSWC Carderock : Carderock, MD | 0.288 | 0.468 | Dec 2016 | 0.286 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 1.042 | - |
| LDUUV Command and Control Engineering Support | WR | SSC Pacific : San Diego, CA | 0.122 | 0.120 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.242 | - |
| LDUUV Acoustic Engineering Support | SS/CPFF | ARL UW : Seattle, WA | 0.200 | 0.000 | Jan 2017 | 0.208 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.408 | - |
| LDUUV Engineering Support | SS/CPFF | APL/JHU : Laurel, MD | 0.275 | 0.116 | Jan 2017 | 0.335 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.726 | - |
| LDUUV ILS & Engineering Support | WR | NUWC Keyport : Keyport, WA | 0.325 | 0.131 | Dec 2016 | 0.125 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.581 | - |
| LDUUV ILS & Engineering Support2 | SS/CPFF | VAR : VAR | 0.110 | 0.063 | Feb 2017 | 0.500 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.673 | - |
| | | **Subtotal** | 28.783 | 2.832 | | 6.662 | | 0.000 | | - | | 0.000 | 0.000 | 38.277 | N/A |

**Remarks**

FY 2019 and future funding for Project 2094 is in Program Element (PE) 0604031N.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603502N / *Surface & Shallow Water MCM* | Project (Number/Name)<br>2094 / *Unmanned Underwater Vehicle* | |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PLUS Fleet Experimentation | Various | Various : Various | 5.077 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 5.077 | - |
| | | **Subtotal** | 5.077 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 5.077 | N/A |

**Remarks**

FY 2019 and future funding for Project 2094 is in Program Element (PE) 0604031N.

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDUUV Program Management | WR | NUWC Newport : Newport, RI | 1.715 | 0.380 | Dec 2016 | 0.536 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 2.631 | - |
| LDUUV Program Management | Various | Various : Various | 1.899 | 1.130 | Dec 2016 | 0.989 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 4.018 | - |
| LDUUV Travel | Various | NAVSEA : Washington, DC | 0.400 | 0.163 | Dec 2016 | 0.162 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.725 | - |
| PLUS Program Management | Various | VAR : VAR | 1.239 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.239 | - |
| PLUS Travel | Various | NAVSEA : Washington, DC | 0.161 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.161 | - |
| | | **Subtotal** | 5.414 | 1.673 | | 1.687 | | 0.000 | | - | | 0.000 | 0.000 | 8.774 | N/A |

**Remarks**

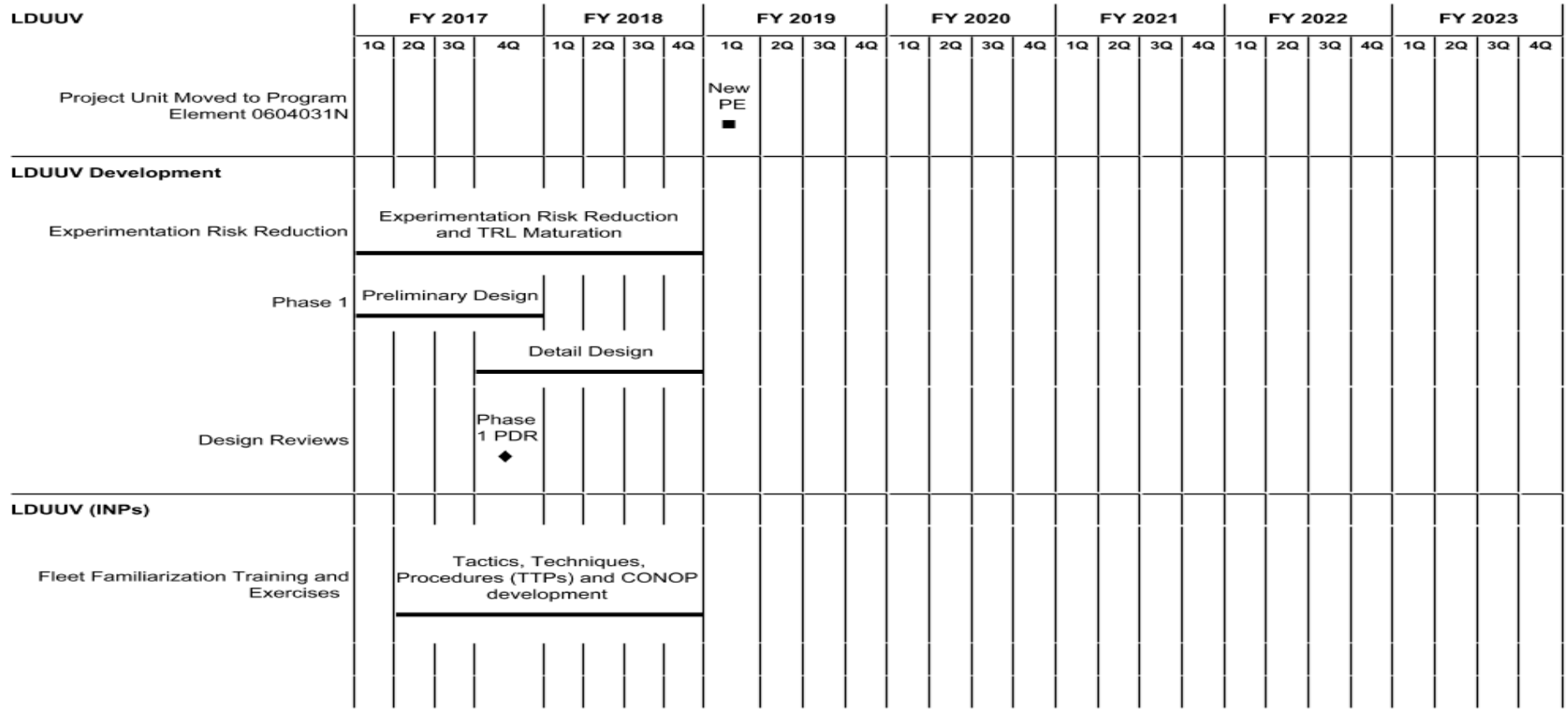
FY 2019 and future funding for Project 2094 is in Program Element (PE) 0604031N.

| | Prior Years | FY 2017 Cost | FY 2017 | FY 2018 Cost | FY 2018 | FY 2019 Base Cost | FY 2019 Base | FY 2019 OCO Cost | FY 2019 OCO | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 64.860 | 21.945 | | 60.187 | | 0.000 | | - | | 0.000 | 0.000 | 146.992 | N/A |

**Remarks**

FY 2019 and future funding for Project 2094 is in Program Element (PE) 0604031N.

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>2094 / *Unmanned Underwater Vehicle* |




*2019PB - 0603502N - 2094.L24*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>2094 / *Unmanned Underwater Vehicle* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***LDUUV*** | | | | |
| Project Unit Moved to Program Element 0604031N: | 1 | 2019 | 1 | 2019 |
| LDUUV Development: Experimentation Risk Reduction: Technology Risk Reduction | 1 | 2017 | 4 | 2018 |
| LDUUV Development: Phase 1: Preliminary Design | 1 | 2017 | 4 | 2017 |
| LDUUV Development: Phase 1: Detail Design | 4 | 2017 | 4 | 2018 |
| LDUUV Development: Design Reviews: Phase 1 PDR | 4 | 2017 | 4 | 2017 |
| LDUUV (INPs): Fleet Familiarization Training and Exercises: Schedule Detail | 2 | 2017 | 4 | 2018 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603502N / *Surface & Shallow Water MCM* | Project (Number/Name)<br>2131 / *Assault Breaching System* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2131: *Assault Breaching System* | 610.235 | 19.651 | 11.623 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 641.509 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

FY 2019 and future funding for Project 2131 is in Program Element (PE) 0604126N. Project realigned from PE 0603502N starting in FY 2019.

**A. Mission Description and Budget Item Justification**

This program provides a combination of U.S. Navy systems to counter the threat to amphibious forces from obstacles and anti-landing/sea mines in the Beach Zone and Surf Zone (0-10 ft water). The Assault Breaching Systems (ABS) consist of a system of systems approach that includes the following programs: JABS - Joint Direct Attack Munition (JDAM) Assault Breaching System; CMS - Countermine System; COBRA - Coastal Battlefield Reconnaissance and Analysis; PNMS - Precision Navigation and Marking System; and C4I - Command, Control, Computers, Communications, and Intelligence. The Assault Breaching Systems enable the Navy-Marine Corps team to conduct Joint Forcible Entry Operations (JFEO), Ship-To-Objective Maneuver (STOM), and other combat operations to project power ashore.

The JDAM Assault Breaching System (JABS) is a currently fielded system that neutralizes surface mines and obstacles in the Beach Zone and Surf Zone. The ABS Tactical Decision Aid optimizes the Desired Points of Impact (DPI) for JDAM munitions to effectively neutralize mines and obstacles while minimizing the required number of munitions and friendly aircraft sorties. Continued testing is required to optimize the ABS Tactical Decision Aid database for the most common enemy mines and obstacles.

Coastal Battlefield Reconnaissance and Analysis (COBRA) is the ABS program to conduct ISR/T. This system provides Airborne Mine Countermeasures (AMCM) capability, and one system consists of two Airborne Payloads and one Post Mission Analysis Station. Block I is a multispectral sensor capable of daytime detection of surface-laid minefields and obstacles in the Beach Zone and adds on-board near real-time processing. Block II capability adds a 3D LIDAR (Light Detection and Ranging) sensor that enables nighttime detection of mines and obstacles in the Beach Zone and the Surf Zone (0-10 ft of water). Block II also adds on-board real-time processing of multispectral imagery data. COBRA consists of a modular payload architecture that can be integrated onto the MQ-8B Fire Scout or USN manned helicopters like the MH-60. COBRA will serve as the "detect" mission module in the Surf Zone and Beach Zone for the Littoral Combat Ship (LCS) Mine Warfare mission package.

Precision Navigation & Marking System (PNMS) provides navigational upgrades for the Landing Craft, Air Cushion (LCAC); Landing Craft, Utility (LCU); and Amphibious Assault Vehicle (AAV). A system of virtual lane marking improves the navigation ability of these three assault craft which enables them to navigate safely through the neutralized assault lanes provided by JABS and CMS. OPN funds the CRAFTALTS to upgrade the navigation systems. LCU Navigation Upgrade: Modernized the navigation system to enable safe transit through the breached lane. LCAC Autopilot Upgrade: An integrated improvement to the LCAC Service Life Extension Program (SLEP) navigation system for craft control that allows precise navigation and hovering within the breached lane. These software upgrades and backfits occur during scheduled LCAC SLEPs. AAV Navigation Upgrade : Modernize the navigation system to enable precise transit through the breached lane.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>2131 / *Assault Breaching System* |

Command, Control, Computers, Communications and Intelligence (C4I) system will tie all of the above systems together under an integrated ABS architecture that is compatible with the existing Mine Warfare architecture.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Product Development: | 11.630 | 7.668 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>COBRA - Increase design and development of COBRA hardware and begin initial integration test planning of additional surf zone capabilities.<br><br>JABS - Continue design and engineering of weapon effectiveness for beach and surf zones.<br><br>Precision Navigation/Marking - Continue evaluation/assessment of EDMs supporting PN/M efforts. | | | | | |
| ***FY 2019 Base Plans:***<br>Funding has been realigned to PE 0604126N. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Funding has been realigned to PE 0604126N. | | | | | |
| ***Title:*** Technical Support: | 1.506 | 0.942 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>COBRA - Continue to provide management and shipping, contract and test/studies, C4I Data Fusion. Provide technical /acquisition support and documentation (ILS, training, data, drawings). | | | | | |
| ***FY 2019 Base Plans:***<br>Funding has been realigned to PE 0604126N. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>2131 / *Assault Breaching System* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Funding has been realigned to PE 0604126N. | | | | | |
| ***Title:*** Test and Evaluation:<br>***Articles:***<br>***FY 2018 Plans:***<br>COBRA - Continue advance surf zone component/capability design and test.<br>JABS - Surf Zone (SZ) and Beach Zone (BZ) characterization testing.<br>***FY 2019 Base Plans:***<br>Funding has been realigned to PE 0604126N.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Funding has been realigned to PE 0604126N. | 5.580<br>- | 2.209<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- |
| ***Title:*** Management:<br>***Articles:***<br>***FY 2018 Plans:***<br>Continue to manage Mine magazine inventory management and shipping, contract management and tests/ studies, C4I/Data fusion.<br>***FY 2019 Base Plans:***<br>Funding has been realigned to PE 0604126N.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Funding has been realigned to PE 0604126N. | 0.935<br>- | 0.804<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- |
| **Accomplishments/Planned Programs Subtotals** | 19.651 | 11.623 | 0.000 | 0.000 | 0.000 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>2131 / *Assault Breaching System* |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • OPN/2624: *SHALLOW WATER Mine CM SHIP* | 8.875 | 8.796 | 8.616 | - | 8.616 | 8.730 | 5.595 | 5.703 | 5.811 | 0.000 | 100.599 |

**Remarks**

**D. Acquisition Strategy**

Countermine/Counter Obstacle (CM/CO)is JDAM Assault Breaching System (JABS) and ABS Tactical Decision Aid testing is ongoing.

Intelligence/Surveillance/Reconnaissance/Targeting (ISR/T) - COBRA Block I achieved MS C in 3rd QTR FY 2009.

Precision Navigation & Marking System (PNMS) - The navigation upgrades for the Landing Craft, Air Cushion (LCAC) and Landing Craft, Utility (LCU) are complete. AAV enhancements will be achieved through an ECP (PMA AAV (Marine Corps)) in 1st QTR FY 2019.

**E. Performance Metrics**

Successful COBRA integration, flight tests: Operational Assessment (OA) and Development Testing (DT) into the MQ-8B FIRESCOUT. COBRA achieved IOC in FY 2017.

The above systems continue to meet or exceed their Key Performance Parameters.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>2131 / *Assault Breaching System* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Primary Hardware Dev, COBRA | C/CPAF | Arete : Tucson, AZ | 172.558 | 9.049 | Jan 2017 | 5.347 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 186.954 | - |
| Primary Hardware Dev, CMS | C/CPAF | Boeing : St. Louis, MO | 99.974 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 99.974 | - |
| Ancillary Hardware Dev, JABS | C/CPAF | Various : Various | 22.078 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 22.078 | - |
| Systems Engineering, COBRA | WR | NSWC, PC : PANAMA CITY, FL | 20.860 | 0.000 | | 0.781 | Oct 2017 | 0.000 | | - | | 0.000 | 0.000 | 21.641 | - |
| Software Dev, COBRA | WR | NAVAIR : Patuxent River, MD | 12.958 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 12.958 | - |
| Systems Engineering, CMS | WR | NSWC, PC : PANAMA CITY, FL | 31.505 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 31.505 | - |
| JABS | WR | NSWC PC : NSWC IH | 8.463 | 1.555 | May 2017 | 0.799 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 10.817 | - |
| Training Dev, COBRA | WR | NSWC, PC : PANAMA CITY, FL | 10.586 | 0.775 | Oct 2016 | 0.559 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 11.920 | - |
| Tooling | WR | NSWC, PC : PANAMA CITY, FL | 0.860 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.860 | - |
| ABS IPT/Test Assets/Proj Eng | WR | NSWC, PC : PANAMA CITY, FL | 9.065 | 0.251 | May 2017 | 0.182 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 9.498 | - |
| Precision Navigation & Marking | WR | NSWC, PC : PANAMA CITY, FL | 16.526 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 16.526 | - |
| | | **Subtotal** | 405.433 | 11.630 | | 7.668 | | 0.000 | | - | | 0.000 | 0.000 | 424.731 | N/A |

**Remarks**

FY 2019 and future funding has been realigned to PE 0604126N.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603502N / *Surface & Shallow Water MCM* | Project (Number/Name)<br>2131 / *Assault Breaching System* | |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Development Support Equipment | WR | NSWC, PC : PANAMA CITY, FL | 20.731 | 0.849 | Oct 2016 | 0.613 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 22.193 | - |
| Software Development | WR | NSWC, PC : PANAMA CITY, FL | 8.037 | 0.202 | Nov 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 8.239 | - |
| Integrated Logistics Support | WR | NSWC PC : PANAMA CITY, FL | 2.712 | 0.099 | Oct 2016 | 0.072 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 2.883 | - |
| Configuration Management | WR | NSWC, PC : PANAMA CITY, FL | 3.744 | 0.100 | Nov 2016 | 0.072 | Oct 2017 | 0.000 | | - | | 0.000 | 0.000 | 3.916 | - |
| Technical Data | WR | NSWC, PC : PANAMA CITY, FL | 2.588 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.588 | - |
| Studies & Analysis | WR | NSWC IH : INDIAN HEAD, MD | 6.276 | 0.256 | Nov 2016 | 0.185 | Oct 2017 | 0.000 | | - | | 0.000 | 0.000 | 6.717 | - |
| GFE | WR | NSWC, PC : PANAMA CITY, FL | 0.400 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.400 | - |
| | | **Subtotal** | 44.488 | 1.506 | | 0.942 | | 0.000 | | - | | 0.000 | 0.000 | 46.936 | N/A |

**Remarks**

FY 2019 and future funding has been realigned to PE 0604126N.

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Development Test & Evaluation | WR | NSWC, IH : INDIAN HEAD, MD | 60.898 | 2.484 | May 2017 | 1.126 | Oct 2017 | 0.000 | | - | | 0.000 | 0.000 | 64.508 | - |
| Operational Test & Evaluation | WR | NSWC/ IH, PC : INDIAN HEAD, PANAMA CITY | 8.655 | 1.074 | Nov 2016 | 0.361 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 10.090 | - |
| Tooling | WR | NSWC/ IH, PC : INDIAN HEAD, PANAMA CITY | 0.700 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.700 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603502N / *Surface & Shallow Water MCM* | Project (Number/Name)<br>2131 / *Assault Breaching System* | |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GFE | WR | NSWC/ IH, PC : INDIAN HEAD, PANAMA CITY | 0.400 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.400 | - |
| Development Test | WR | NSWC PC : Panama City, FL | 13.634 | 2.022 | May 2017 | 0.722 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 16.378 | - |
| | | **Subtotal** | 84.287 | 5.580 | | 2.209 | | 0.000 | | - | | 0.000 | 0.000 | 92.076 | N/A |

**Remarks**

FY 2019 and future funding has been realigned to PE 0604126N.

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Contractor Engineering Support | C/CPFF | BAH, Northrop Grumman : DC, FL | 10.935 | 0.125 | Dec 2016 | 0.090 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 11.150 | - |
| Government Engineering Support | WR | NSWC, IH : INDIAN HEAD, MD | 36.077 | 0.409 | May 2017 | 0.359 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 36.845 | - |
| Program Management Support | WR | NSWC/ IH, PC : INDIAN HEAD, PANAMA CITY | 25.657 | 0.351 | Apr 2017 | 0.318 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 26.326 | - |
| Travel | WR | NAVSEA : WNY, DC | 1.713 | 0.050 | Oct 2016 | 0.037 | Oct 2017 | 0.000 | | - | | 0.000 | 0.000 | 1.800 | - |
| Assessment/BTR | C/CPAF | VARIOUS : VARIOUS | 1.434 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.434 | - |
| Acquisition Workforce | Various | VARIOUS : VARIOUS | 0.211 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.211 | - |
| | | **Subtotal** | 76.027 | 0.935 | | 0.804 | | 0.000 | | - | | 0.000 | 0.000 | 77.766 | N/A |

**Remarks**

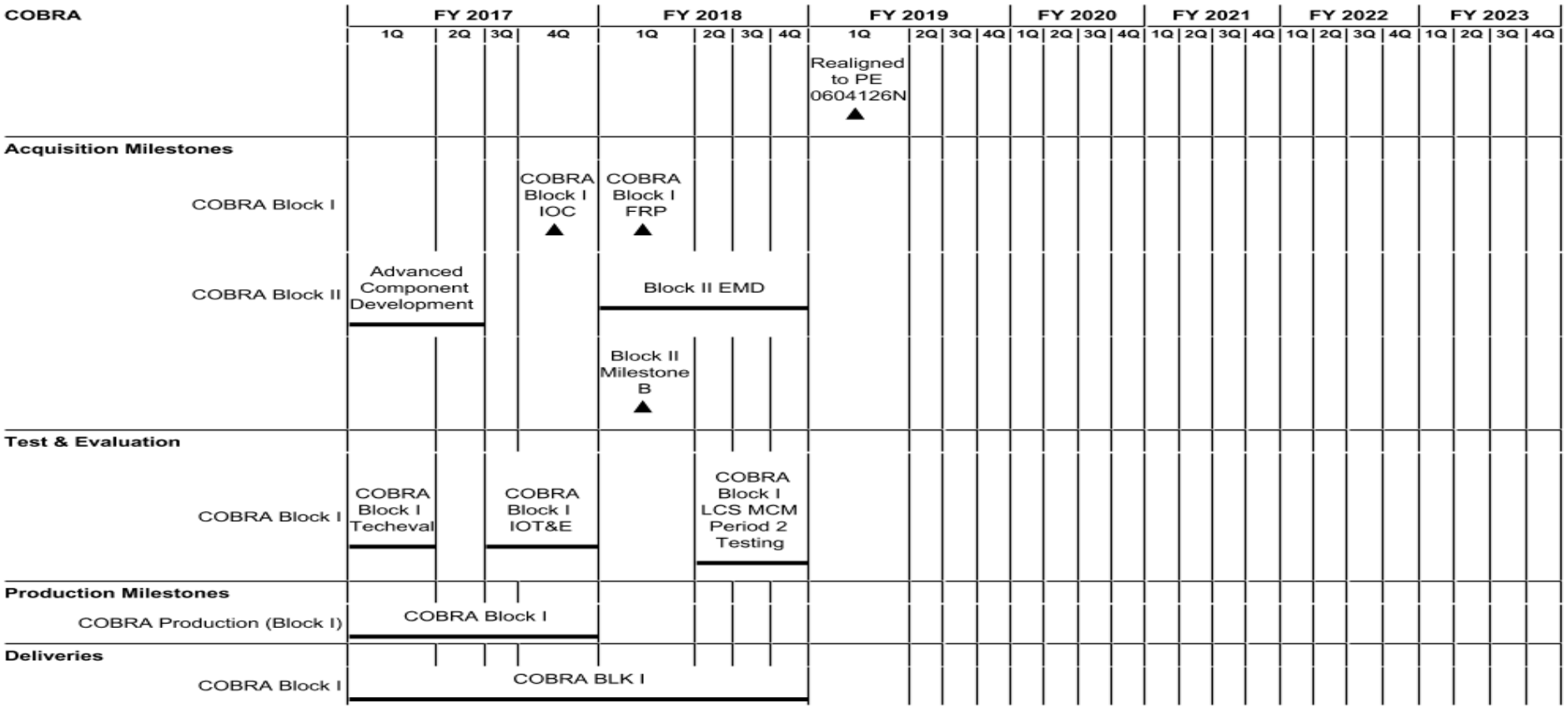
FY 2019 and future funding has been realigned to PE 0604126N.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603502N / *Surface & Shallow Water MCM* | Project (Number/Name)<br>2131 / *Assault Breaching System* | |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 610.235 | 19.651 | | 11.623 | | 0.000 | | - | | 0.000 | 0.000 | 641.509 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>2131 / *Assault Breaching System* |




*2019PB - 0603502N - 2131*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>2131 / *Assault Breaching System* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***COBRA*** | | | | |
| Schedule Detail | 1 | 2019 | 1 | 2019 |
| Acquisition Milestones: COBRA Block I: COBRA Block I IOC | 4 | 2017 | 4 | 2017 |
| Acquisition Milestones: COBRA Block I: COBRA Block I FRP | 1 | 2018 | 1 | 2018 |
| Acquisition Milestones: COBRA Block II: Advanced Component Development | 1 | 2017 | 2 | 2017 |
| Acquisition Milestones: COBRA Block II: COBRA Block II EMD | 1 | 2018 | 4 | 2018 |
| Acquisition Milestones: COBRA Block II: COBRA Block II Milestone B | 1 | 2018 | 1 | 2018 |
| Test & Evaluation: COBRA Block I: COBRA Block I Techeval (DT Phase 2) | 1 | 2017 | 1 | 2017 |
| Test & Evaluation: COBRA Block I: COBRA Block I IOT&E | 3 | 2017 | 4 | 2017 |
| Test & Evaluation: COBRA Block I: COBRA Block I LCS MCM Period 2 Testing | 2 | 2018 | 4 | 2018 |
| Production Milestones: COBRA Production (Block I): COBRA Block I | 1 | 2017 | 4 | 2017 |
| Deliveries: COBRA Block I: Block I | 1 | 2017 | 4 | 2018 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603502N / *Surface & Shallow Water MCM* | Project (Number/Name)<br>2989 / *Barracuda* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2989: *Barracuda* | 0.000 | 0.000 | 20.761 | 31.282 | - | 31.282 | 32.237 | 31.625 | 37.415 | 38.227 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The Barracuda program provides an expendable, low cost, and unmanned mine neutralization capability against previously located near-surface mines with the potential to address other targets. Barracuda is a mine neutralization system with the form factor of an A-size sonobuoy. It is a modular weapon that will be stored and assembled on LCS, will be deployed from the Mine Countermeasures Unmanned Surface Vehicle (MCM USV), and will maintain communications with the operator on LCS while autonomously re-acquiring mines in the near surface and await a fire command from the operator on board LCS.

An Analysis of Alternatives (AoA) was conducted in June 2015 to address the unmet near surface requirements resulting from cancelation of the RAMICS program in FY13. Several systems were considered and Barracuda was selected. The Naval Capabilities Board (NCB) approved the AoA results for the Gate 2 decision in July 2015.The NCB endorsed the Barracuda Capabilities Development Document (CDD) for the Gate 3 decision in April 2016; CDD was approved in September 2016.

The Barracuda baseline capability is transitioned from the Office of Naval Research (ONR) Single Sortie Detect-To-Engage (SS DTE) Future Naval Capability (FNC). Barracuda provides the only near surface mine neutralization system that will allow the Littoral Combat Ship (LCS) Mine Countermeasure (MCM) Mission Package (MP) to fully meet its two minehunting performance requirements. Initial Barracuda deployment will be on the MCM USV as part of the LCS MCM MP. Subsequent plans are to expand potential means of providing in-stride MCM capabilities and transitioning follow-on FNCs from ONR. Barracuda may be hosted by an LCS, Expeditionary Sea Base (ESB), or shore facility.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Barracuda: Product Development | 0.000 | 16.118 | 25.879 | 0.000 | 25.879 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Conduct Barracuda Integrated Baseline Review (IBR) to confirm sufficient resource loading and establish a baseline to track earned value. Initiate detailed design of the system starting with conducting a System Requirements Review (SRR) to verify requirements traceability, conduct a System Functional Review (SFR), and prepare for Milestone B and contract award. | | | | | |
| ***FY 2019 Base Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>2989 / *Barracuda* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Begin component modeling, simulation, fabrication and testing to verify design in preparation for Preliminary Design Review (PDR). Conduct and manage safety reviews as development efforts proceed.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY2019 funding increase supports modeling and simulation efforts following Milestone B and EM&D. | | | | | |
| ***Title:*** Barracuda: Engineering Support<br>***Articles:***<br>***FY 2018 Plans:***<br>Complete source selection and complete contract award. Manage contractor deliverables and oversee contractor Systems Engineering Technical Reviews (SETR), including IBR, SRR, and SFR.<br>***FY 2019 Base Plans:***<br>Review, evaluate and manage contractor deliverables and contractor detailed design effort in preparation for CDR.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY2019 funding increase supports modeling and simulation efforts following Milestone B and EM&D. | 0.000<br>- | 4.357<br>- | 5.167<br>- | 0.000<br>- | 5.167<br>- |
| ***Title:*** Barracuda: Management Services<br>***Articles:***<br>***FY 2018 Plans:***<br>Provide program management, financial management, and engineering support.<br>***FY 2019 Base Plans:***<br>Continue to provide program management, financial management, and engineering support.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:*** | 0.000<br>- | 0.286<br>- | 0.236<br>- | 0.000<br>- | 0.236<br>- |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>2989 / *Barracuda* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| FY2019 funding increase supports modeling and simulation efforts following Milestone B and EM&D. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 20.761 | 31.282 | 0.000 | 31.282 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • 0604373N/2473: *Airborne Mine Countermeasures* | 7.357 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 7.357 |

**Remarks**

Barracuda FY17 funding in budget PE 0604373N and realigned to PE 0603502N in FY18 - FY23.

**D. Acquisition Strategy**

Transition ONR FNC SS DTE to Barracuda in FY17 and FY18 following the same approach to design a low cost modular neutralizer that leverages economies of scale and reduces total ownership cost. Release the Barracuda RFP in 3QFY17. Achieve Milestone B in 2QFY18. Award a cost plus incentive fee base contract to design and deliver 750 Engineering Development Models (EDMs) with two cost plus fixed fee Low Rate Initial Production (LRIP) options to manufacture and deliver 1000 Barracudas per option. Base award will occur in 3QFY18. LRIP option #1 planned to be exercised in FY25 and LRIP option #2 in FY26. Manage the production cost model throughout the detailed design effort to deliver a low cost design in the Technical Data Package (TDP). There will be Government Purpose Rights on the TDP that will enable release of the TDP for a full and open competition of the Full Rate Production (FRP) contract planned in FY27. Initial Operating Capability (IOC) planned for 4QFY25.

**E. Performance Metrics**

Efficient design, fabrication, and testing to deliver a low cost solution that achieves required probability of kill against near surface mines.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603502N / *Surface & Shallow Water MCM* | Project (Number/Name)<br>2989 / *Barracuda* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Barracuda Hardware/ Support | C/CPIF | TBD : TBD | 0.000 | 0.000 | | 16.118 | May 2018 | 25.879 | May 2019 | - | | 25.879 | 0.000 | 41.997 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 16.118 | | 25.879 | | - | | 25.879 | 0.000 | 41.997 | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Barracuda Engineering Support | WR | NUWC NPT : Newport, RI | 0.000 | 0.000 | | 0.544 | Dec 2017 | 0.549 | Dec 2018 | - | | 0.549 | Continuing | Continuing | Continuing |
| Barracuda Engineering Services | C/CPIF | JHU APL : Baltimore, MD | 0.000 | 0.000 | | 0.668 | Dec 2017 | 0.826 | Nov 2018 | - | | 0.826 | Continuing | Continuing | Continuing |
| Barracuda Engineering Support | WR | NSWC, PC : Panama City, FL | 0.000 | 0.000 | | 1.341 | Nov 2017 | 1.472 | Nov 2018 | - | | 1.472 | Continuing | Continuing | Continuing |
| Barracuda Support | WR | NSWC, IHD : Indian Head, MD | 0.000 | 0.000 | | 1.357 | Dec 2017 | 1.432 | Nov 2018 | - | | 1.432 | 0.000 | 2.789 | - |
| Barracuda Support | WR | Naval Research Lab : Washington, DC | 0.000 | 0.000 | | 0.193 | Dec 2017 | 0.578 | Jan 2019 | - | | 0.578 | 0.000 | 0.771 | - |
| Barracuda Support | WR | NSWC, Carderock : Bethesda, MD | 0.000 | 0.000 | | 0.254 | Dec 2017 | 0.310 | Jan 2019 | - | | 0.310 | 0.000 | 0.564 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 4.357 | | 5.167 | | - | | 5.167 | Continuing | Continuing | N/A |

**Management Services ($ in Millions)**

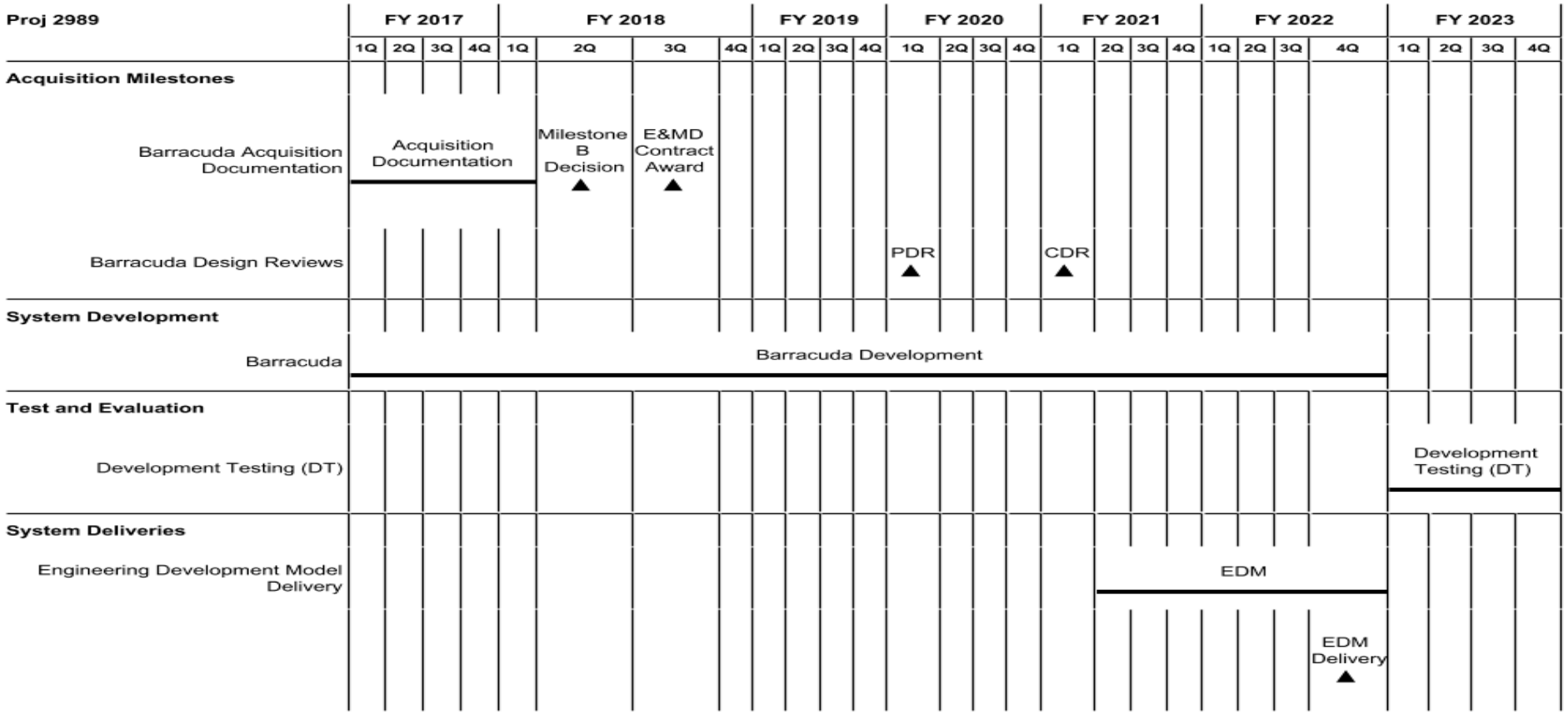
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Barracuda Management Support | WR | NSWC, PC : Panama City, FL | 0.000 | 0.000 | | 0.286 | Dec 2017 | 0.236 | Dec 2018 | - | | 0.236 | 0.000 | 0.522 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.286 | | 0.236 | | - | | 0.236 | 0.000 | 0.522 | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603502N / *Surface & Shallow Water MCM* | Project (Number/Name)<br>2989 / *Barracuda* | |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 20.761 | | 31.282 | | - | | 31.282 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>2989 / *Barracuda* |




*2019DON - 0603502N - 2989*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>2989 / *Barracuda* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 2989*** | | | | |
| Acquisition Milestones: Barracuda Acquisition Documentation: Acquisition Documentation | 1 | 2017 | 1 | 2018 |
| Acquisition Milestones: Barracuda Acquisition Documentation: Milestone B Decision | 2 | 2018 | 2 | 2018 |
| Acquisition Milestones: Barracuda Acquisition Documentation: Contract Award | 3 | 2018 | 3 | 2018 |
| Acquisition Milestones: Barracuda Design Reviews: Preliminary Design Review | 1 | 2020 | 1 | 2020 |
| Acquisition Milestones: Barracuda Design Reviews: Critical Design Review | 1 | 2021 | 1 | 2021 |
| System Development: Barracuda: Barracuda Development | 1 | 2017 | 4 | 2022 |
| Test and Evaluation: Development Testing (DT): Development Testing (DT): Development Testing (DT) | 1 | 2023 | 4 | 2023 |
| System Deliveries: Engineering Development Model Delivery: Engineering Development Model Delivery | 2 | 2021 | 4 | 2022 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603502N / *Surface & Shallow Water MCM* | Project (Number/Name)<br>3123 / *SMCM UUV* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3123: *SMCM UUV* | 135.530 | 20.890 | 25.052 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 181.472 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

FY 2019 and future funding for Project 3123 is in Program Element (PE) 0604028N. Project realigned from PE 0603502N starting in FY 2019.

**A. Mission Description and Budget Item Justification**

In order to accelerate future capability and support steady growth of the fleet's UUV Family of Systems (FoS) the Knifefish Surface Mine Countermeasure Unmanned Undersea Vehicle (SMCM UUV) program develops new, advanced Unmanned Undersea Vehicles (UUVs) to support clandestine mine detection capability against volume, bottom, and buried mines. Equipment includes vehicles and associated systems support equipment. In parallel, Pre-Planned Product Improvement (P3I) design efforts are ongoing to support insertion of incremental capability when the technology is ready. Planned P3I candidates being considered include increased detection range capability, communications upgrades, on-board sonar processing and target recognition, command and control improvements, and other smaller tasks.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Knifefish SMCM UUV | 20.890 | 25.052 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Complete CT and Developmental Testing (DT)/Operational Assessment (OA). Achieve Milestone C in 3QFY18. Conduct Pre-Planned Product Improvement (P3I) development efforts to increase sonar range by 3x and lay initial foundation for follow-on P3I efforts (onboard processing, re-acquisition, dual-side sonar, and increased endurance). Component fabrication, testing, and initial integration of P3I efforts to increase sonar range. | | | | | |
| ***FY 2019 Base Plans:***<br>Funding realigned to PE 0604028N. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2019 funding has been realigned to PE 0604028N. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 20.890 | 25.052 | 0.000 | 0.000 | 0.000 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>3123 / *SMCM UUV* |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • OPN/2622: *Minesweeping Replacement* | 26.764 | 31.531 | 35.709 | - | 35.709 | 55.949 | 51.338 | 34.007 | 16.753 | Continuing | Continuing |
| • OPN/1601: *LCS MCM Mission Modules* | 29.724 | 55.870 | 124.147 | - | 124.147 | 204.324 | 245.108 | 227.068 | 234.109 | 1,501.531 | 2,771.262 |
| • RDTEN/0603018N/3123: *SMCM UUV* | 0.000 | 0.000 | 16.717 | - | 16.717 | 22.747 | 23.598 | 24.031 | 24.031 | Continuing | Continuing |

**Remarks**

The above OPN funding lines account for several programs, of which the Knifefish program is only a portion.

**D. Acquisition Strategy**

The Knifefish program was initiated in FY11 to develop Surface Mine Countermeasure Unmanned Undersea Vehicles (SMCM UUV) equipped with advanced Low Frequency Broadband (LFBB) sonar that provides volume, bottom, and buried mine detection capability. Procurement of the SMCM UUV with LFBB will occur after Milestone C.

**E. Performance Metrics**

Successful Milestone C in 3Q FY 2018 and FRP Decision in FY 2019.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>3123 / *SMCM UUV* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SMCM UOES Development | C/CPAF | BLUEFIN : CAMBRIDGE, MA | 15.142 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 15.142 | - |
| Knifefish Development | C/CPIF | Various : Various | 17.497 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 17.497 | - |
| Knifefish Development & Engineering Support | C/CPIF | General Dynamics AIS : McLeansville, NC | 67.124 | 14.696 | Dec 2016 | 9.134 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 90.954 | - |
| Hardware/Software Development - Support Equipment | WR | NSWC, PC : PANAMA CITY, FL | 2.429 | 3.000 | Dec 2016 | 1.250 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 6.679 | - |
| Knifefish P3I Development Contractor | C/CPIF | GDMS : McLeansville, NC | 0.000 | 0.000 | | 4.908 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 4.908 | - |
| | | **Subtotal** | 102.192 | 17.696 | | 15.292 | | 0.000 | | - | | 0.000 | 0.000 | 135.180 | N/A |

**Remarks**

FY 2019 and future funding has been realigned to PE 0604028N.

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Engineering Support | WR | NSWC, PC : PANAMA CITY, FL | 16.769 | 2.369 | Dec 2016 | 1.000 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 20.138 | - |
| Engineering Support | WR | NUWC, Newport : NEWPORT, RI | 5.728 | 0.490 | Dec 2016 | 0.400 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 6.618 | - |
| Engineering Support | WR | VARIOUS : VARIOUS | 4.479 | 0.313 | Dec 2016 | 1.000 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 5.792 | - |
| Engineering Support P3I | WR | NSWC, PC : PANAMA CITY, FL | 0.000 | 0.000 | | 0.500 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.500 | - |
| Engineering Support P3I | WR | NUWC, Newport : NEWPORT, RI | 0.000 | 0.000 | | 0.250 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.250 | - |
| Engineering Support P3I | WR | VARIOUS : VARIOUS | 0.000 | 0.000 | | 3.800 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 3.800 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603502N / *Surface & Shallow Water MCM* | Project (Number/Name)<br>3123 / *SMCM UUV* | |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Subtotal** | 26.976 | 3.172 | | 6.950 | | 0.000 | | - | | 0.000 | 0.000 | 37.098 | N/A |

**Remarks**

FY 2019 and future funding has been realigned to PE 0604028N.

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Developmental Test & Evaluation | WR | NOMWC : STENNIS, MS | 0.526 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.526 | - |
| Government T&E Support | WR | VARIOUS : VARIOUS | 1.329 | 0.000 | | 0.920 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 2.249 | - |
| Test and Evaluation | WR | COMOPTEVFOR : NORFOLK, VA | 0.556 | 0.000 | | 0.160 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.716 | - |
| Government T&E Support | WR | NSWC, PC : PANAMA CITY, FL | 0.449 | 0.000 | | 0.500 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.949 | - |
| | | **Subtotal** | 2.860 | 0.000 | | 1.580 | | 0.000 | | - | | 0.000 | 0.000 | 4.440 | N/A |

**Remarks**

FY 2019 and future funding has been realigned to PE 0604028N.

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management Support | C/CPFF | VARIOUS : WASHINGTON, DC | 3.120 | 0.000 | | 1.105 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 4.225 | - |
| Travel | WR | NAVSEA : WNY, DC | 0.335 | 0.022 | Dec 2016 | 0.125 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.482 | - |
| Acquisition Workforce | WR | VARIOUS : VARIOUS | 0.047 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.047 | - |
| | | **Subtotal** | 3.502 | 0.022 | | 1.230 | | 0.000 | | - | | 0.000 | 0.000 | 4.754 | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>3123 / *SMCM UUV* |

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

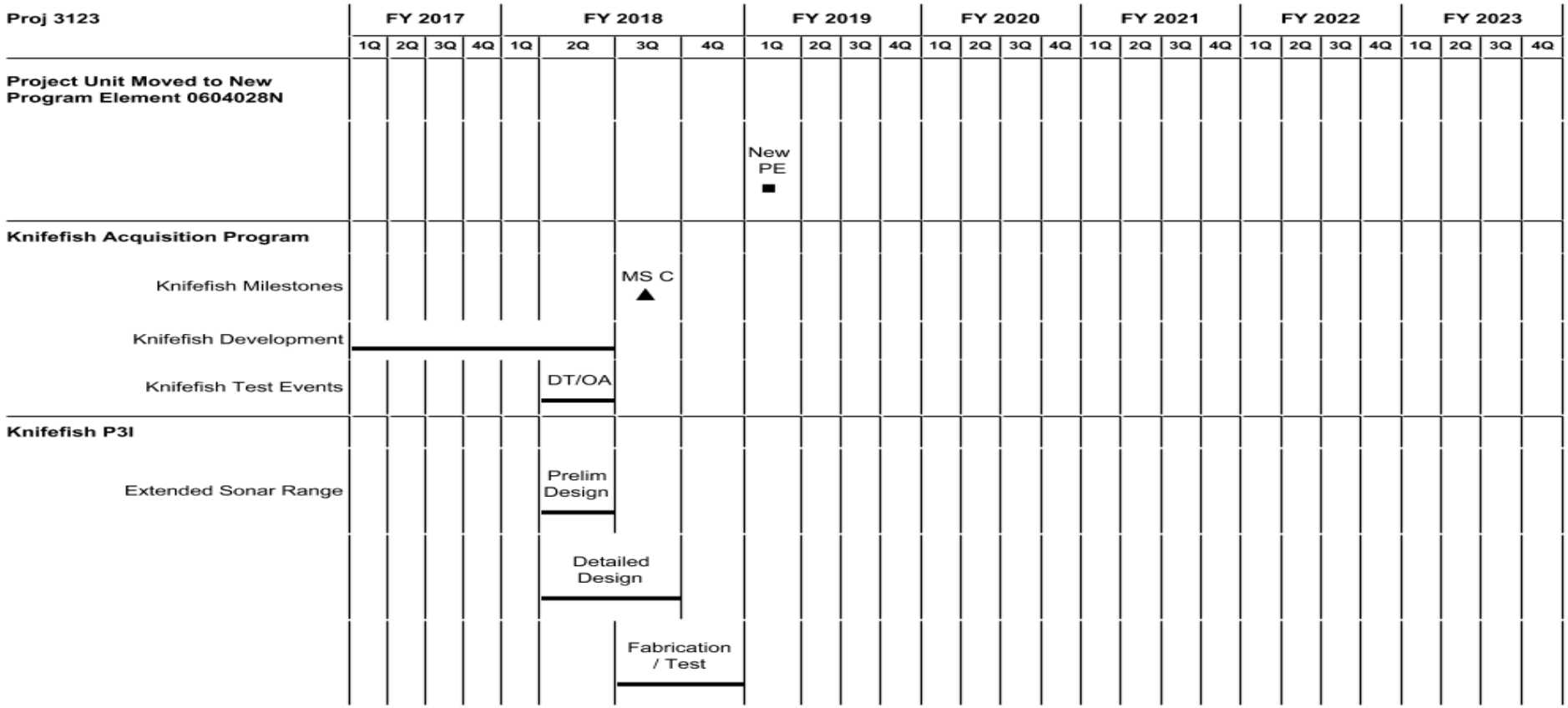
**Remarks**

FY 2019 and future funding has been realigned to PE 0604028N.

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 135.530 | 20.890 | | 25.052 | | 0.000 | | - | | 0.000 | 0.000 | 181.472 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>3123 / *SMCM UUV* |




*2019PB - 0603502N - 3123*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>3123 / *SMCM UUV* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3123*** | | | | |
| Project Unit Moved to New Program Element 0604028N: | 1 | 2019 | 1 | 2019 |
| Knifefish Acquisition Program: Knifefish Milestones: Milestone C | 3 | 2018 | 3 | 2018 |
| Knifefish Acquisition Program: Knifefish Development: | 1 | 2017 | 2 | 2018 |
| Knifefish Acquisition Program: Knifefish Test Events: DT/OA | 2 | 2018 | 2 | 2018 |
| Knifefish P3I: Extended Sonar Range: Extended Range Prelim Design | 2 | 2018 | 2 | 2018 |
| Knifefish P3I: Extended Sonar Range: Extended Range Detailed Design | 2 | 2018 | 3 | 2018 |
| Knifefish P3I: Extended Sonar Range: Extended Range Fabrication/Test | 3 | 2018 | 4 | 2018 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603502N / *Surface & Shallow Water MCM* | Project (Number/Name)<br>3428 / *Medium Displacement Unmanned Surface Vehicle (MDUSV)* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3428: *Medium Displacement Unmanned Surface Vehicle (MDUSV)* | 0.000 | 0.000 | 0.000 | 2.800 | - | 2.800 | 23.900 | 26.300 | 30.000 | 43.000 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

Medium Displacement Unmanned Surface Vehicle (MDUSV) is a new start in FY2019

**A. Mission Description and Budget Item Justification**

Startup of efforts for the new Medium Displacement USV starting in FY19 which will serve as the unmanned surface vessel portion of the Navy's Future Surface Combatant (FSC) strategy. The FSC USV is intended to provide low-cost, high endurance, reconfigurable ships able to accommodate various payloads for unmanned missions in support of the Navy's Surface Fleet. FSC USVs will be optionally manned and will operate autonomously while collaborating with US Navy combatants. The FSC USVs can be sent forward alone, work as a team, or accompany individual combatants or battle groups. Expected missions include electronic warfare, anti-surface warfare, strike, or others.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Product Development | 0.000 | 0.000 | 1.900 | 0.000 | 1.900 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>N/A | | | | | |
| ***FY 2019 Base Plans:***<br>Begin initial concept design efforts and analysis of alternatives planning for FSC USV efforts. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Funding for initial concept design commences in FY19. | | | | | |
| ***Title:*** Support | 0.000 | 0.000 | 0.700 | 0.000 | 0.700 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>3428 / *Medium Displacement Unmanned Surface Vehicle (MDUSV)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A<br>***FY 2019 Base Plans:***<br>Begin engineering and technical support for future surface combatant (FSC) USV efforts.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Funding for FSC support commences in FY19. | | | | | |
| ***Title:*** Management<br>***Articles:*** | 0.000<br>- | 0.000<br>- | 0.200<br>- | 0.000<br>- | 0.200<br>- |
| ***FY 2018 Plans:***<br>N/A<br>***FY 2019 Base Plans:***<br>Conduct management and program efforts for future surface combatant (FSC) USV efforts.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Funding for FSC management commences in FY19. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 0.000 | 2.800 | 0.000 | 2.800 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

FSC USV is an ideal candidate for an accelerated acquisition approach and that will be evaluated as an option. Ongoing Medium/Large USV efforts (ACTUV/Sea Hunter and SCO efforts) will serve as Technology Maturation and Risk Reduction efforts. Pre-Milestone A FSC USV activities (requirements document development, conduct of AoA) will provide basis for establishing the Program of Record. Acquisition Strategy, including contracting strategy, will be developed in FY20 to support a notional MS A decision in FY21. Two development contracts will be competitively awarded in FY23 following a notional MS B decision.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>3428 / *Medium Displacement Unmanned Surface Vehicle (MDUSV)* |

**E. Performance Metrics**

Successful Milestone A decision in FY21.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>3428 / *Medium Displacement Unmanned Surface Vehicle (MDUSV)* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Development Efforts | TBD | Various : Various | 0.000 | 0.000 | | 0.000 | | 1.900 | Dec 2018 | - | | 1.900 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 1.900 | | - | | 1.900 | Continuing | Continuing | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Engineering Support | WR | Various : Various | 0.000 | 0.000 | | 0.000 | | 0.700 | Dec 2018 | - | | 0.700 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 0.700 | | - | | 0.700 | Continuing | Continuing | N/A |

**Management Services ($ in Millions)**

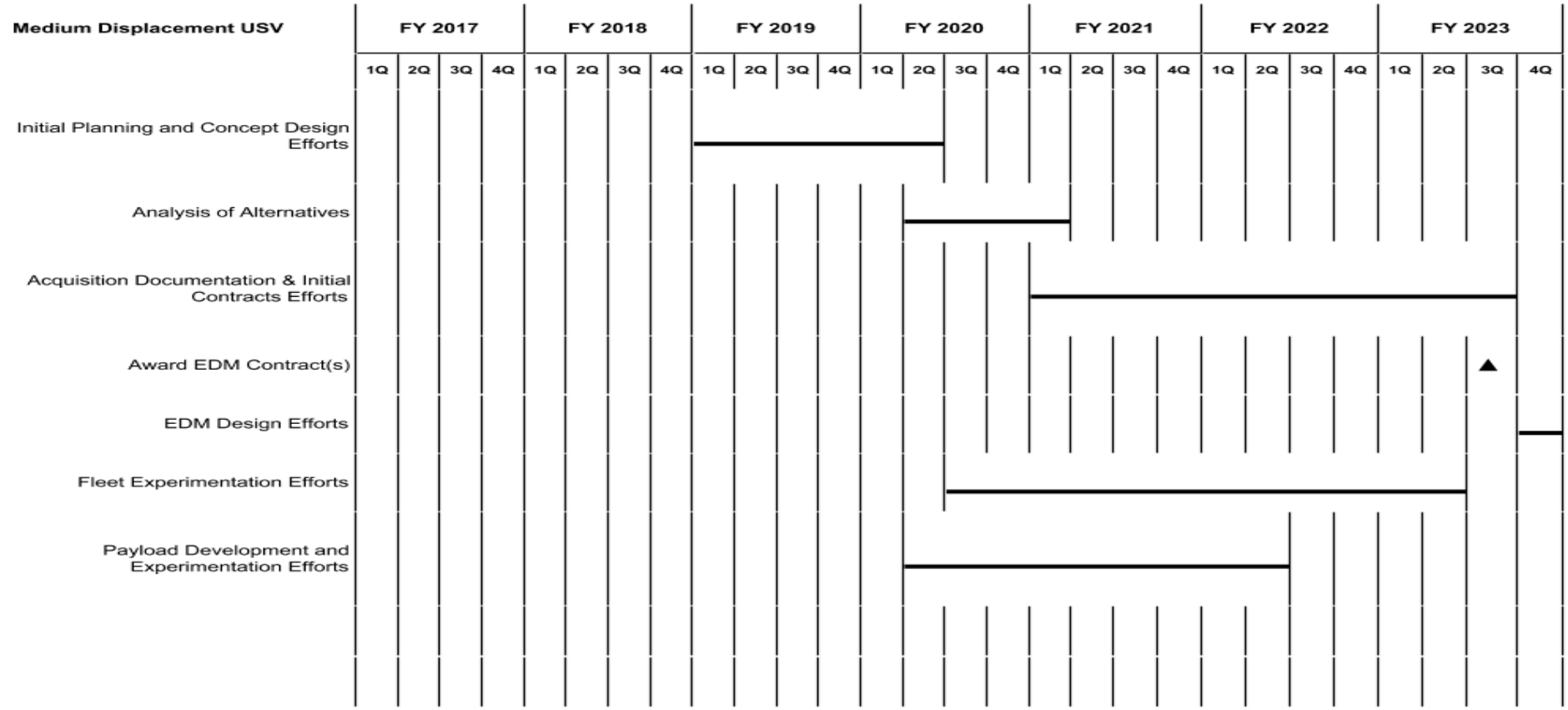
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management Support | C/CPFF | Various : Washington, DC | 0.000 | 0.000 | | 0.000 | | 0.200 | Dec 2018 | - | | 0.200 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 0.200 | | - | | 0.200 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 0.000 | | 2.800 | | - | | 2.800 | Continuing | Continuing | N/A |

**Remarks**

New effort starting in FY19 for the USV portion of the Future Surface Combatant.

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>3428 / *Medium Displacement Unmanned Surface Vehicle (MDUSV)* |




*2019PB - 0603502N - 3428*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603502N / *Surface & Shallow Water MCM* | **Project (Number/Name)**<br>3428 / *Medium Displacement Unmanned Surface Vehicle (MDUSV)* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Medium Displacement USV*** | | | | |
| Initial Planning and Concept Design Efforts: Schedule Detail | 1 | 2019 | 2 | 2020 |
| Analysis of Alternatives: Schedule Detail | 2 | 2020 | 1 | 2021 |
| Acquisition Documentation & Initial Contracts Efforts: Schedule Detail | 1 | 2021 | 3 | 2023 |
| Award EDM Contract(s): Schedule Detail | 3 | 2023 | 3 | 2023 |
| EDM Design Efforts: Schedule Detail | 4 | 2023 | 4 | 2023 |
| Fleet Experimentation Efforts: Schedule Detail | 3 | 2020 | 2 | 2023 |
| Payload Development and Experimentation Efforts: Schedule Detail | 2 | 2020 | 2 | 2022 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | | Date: February 2018 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603506N *I Surface Ship Torpedo Defense* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 679.666 | 69.872 | 14.974 | 8.570 | - | 8.570 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 773.082 |
| 0225: *Surface Ship Torpedo Defense (SSTD)* | 679.666 | 69.872 | 14.974 | 8.570 | - | 8.570 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 773.082 |

**A. Mission Description and Budget Item Justification**

The Surface Ship Torpedo Defense (SSTD) program provides a detect-to-engage layered torpedo defense capability. The four major efforts that comprise SSTD are the AN/SLQ-25 (NIXIE) system, Torpedo Warning System (TWS), the Countermeasure Anti-Torpedo (CAT) and Acoustic Device Countermeasure (Surface ADC MK2). CAT and TWS are development programs. The CAT program develops a canisterized Anti-Torpedo Torpedo (ATT). The TWS program develops the required torpedo detection, classification and localization (TDCL) ship systems to employ CAT. The TWS and CAT systems make up the Anti-Torpedo Torpedo Defense System (ATTDS).

The ATTDS provides a hard kill torpedo defense capability on High Value Units (HVU's). The program has developed and fielded five ATTDS Engineering Design Model (EDM) systems on CVNs. Each EDM system is one TWS with a CAT load out of a maximum of eight CATs. The program delivered its first prototype system in FY13 and has delivered and installed its fifth and final system in FY17. Along with delivering and installing systems on CVN's the ATTDS Program completed system salvo software development and a Quick Reaction Assessment (QRA) test in 1QFY18. The AN/SLQ-25 (NIXIE) is a towed acoustic and non-acoustic countermeasure system. The AN/SLQ-25 program develops countermeasure technologies and capabilities to improve ship survivability against future torpedo threats.

Research and development of new technologies and capabilities developed under the Future Naval Capabilities (FNC), Small Business and Innovative Research (SBIR), and other Research, Development, Test & Evaluation (RDT&E) initiatives. New and emerging hardware and software are evaluated in representative acoustic environments, against projected threats through both digital and hardware-in-the-loop simulations, to determine their effectiveness and impact on improving ship survivability. The technology is then incorporated into the appropriate product line.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | Date: February 2018 |
|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | R-1 Program Element (Number/Name)<br>PE 0603506N *I Surface Ship Torpedo Defense* | | | |
| **B. Program Change Summary ($ in Millions)** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** |
| Previous President's Budget | 87.066 | 14.974 | 8.570 | - | 8.570 |
| Current President's Budget | 69.872 | 14.974 | 8.570 | - | 8.570 |
| Total Adjustments | -17.194 | 0.000 | 0.000 | - | 0.000 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -1.681 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | 0.000 | - | 0.000 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | 0.000 | - | 0.000 |
| • Congressional Directed Reductions Adjustments | -15.513 | - | - | - | - |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603506N / *Surface Ship Torpedo Defense* | Project (Number/Name)<br>0225 / *Surface Ship Torpedo Defense (SSTD)* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0225: *Surface Ship Torpedo Defense (SSTD)* | 679.666 | 69.872 | 14.974 | 8.570 | - | 8.570 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 773.082 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The Countermeasure Anti- Torpedo (CAT) program developed a canisterized Anti-Torpedo Torpedo (ATT). The Torpedo Warning System (TWS) developed the required torpedo detection, classification and localization (TDCL)systems. The Countermeasure TWS and CAT systems make up the Anti-Torpedo Torpedo Defense System (ATTDS).

The ATTDS provides a hard kill torpedo defense capability on High Value Units (HVU's). The program has developed and fielded five ATTDS Engineering Design Model (EDM) systems on CVNs. Each EDM system is one TWS with a CAT load out of a maximum of eight CATs. The program delivered its first prototype system in FY13 and has delivered and installed its fifth and final system in FY17. Along with delivering and installing systems on CVN's the ATTDS Program completed system salvo software development and a Quick Reaction Assessment (QRA) test in 1QFY18.

In FY18, no program of record acquisition milestones were pursued. In FY19, software support, material engineering changes, and system reliability will remain the programs top priorities to ensure the highest operational availability and performance of the systems.

Research and development of new technologies and capabilities developed under the Future Naval Capabilities (FNC), Small Business and Innovative Research (SBIR), and other Research, Development, Test & Evaluation (RDT&E) initiatives. New and emerging hardware and software are evaluated in representative acoustic environments, against projected threats through both digital and hardware-in-the-loop simulations, to determine their effectiveness and impact on improving ship survivability. The technology is then incorporated into the appropriate product line.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Countermeasure Anti-Torpedo (CAT) | 23.452 | 7.000 | 3.600 | 0.000 | 3.600 |
| ***Articles:*** | 24 | - | - | - | - |
| ***FY 2018 Plans:*** | | | | | |
| Continue land based reliability testing on returning deployed ATTs. | | | | | |
| Continue engineering changes on CAT materials and CAT software upgrades. | | | | | |
| Perform Safety Certifications prior to two FY18 CVN deployments. | | | | | |
| Deliver Ready for Issue CATs for two FY18 CVN deployments. | | | | | |
| Support software resolution through Program Trouble Reports (PTRs). | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603506N / *Surface Ship Torpedo Defense* | **Project (Number/Name)**<br>0225 / *Surface Ship Torpedo Defense (SSTD)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Conduct Quick Reaction Assessment (QRA) of salvo software.<br>Conduct CT-5 contractor test.<br>***FY 2019 Base Plans:***<br>Continue land based reliability testing on returning deployed ATTs.<br>Continue engineering changes on CAT materials and CAT software upgrades.<br>Support software resolution through Program Trouble Reports (PTRs).<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 18 to FY 19 decrease due to planned phasing of testing and support events. | | | | | |
| ***Title:*** Torpedo Warning System (TWS) | 46.420 | 7.974 | 4.970 | 0.000 | 4.970 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Continue land based reliability testing on returning deployed TWS systems.<br>Continue engineering changes on TWS software upgrades.<br>Perform Safety Certifications prior to two FY18 CVN deployments.<br>Perform system operational verification testing prior to two FY18 CVN deployments.<br>Support software resolution through Program Trouble Reports (PTRs).<br>Complete RORO to EDM conversion on CVN69.<br>***FY 2019 Base Plans:***<br>Continue land based reliability testing on returning deployed TWS systems.<br>Continue engineering changes on TWS software upgrades.<br>Support software resolution through Program Trouble Reports (PTRs).<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 18 to FY 19 decrease due to planned phasing of testing and support events. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 69.872 | 14.974 | 8.570 | 0.000 | 8.570 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603506N / *Surface Ship Torpedo Defense* | **Project (Number/Name)**<br>0225 / *Surface Ship Torpedo Defense (SSTD)* |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • OPN/2213: *SSTD* | 6.893 | 12.867 | 11.277 | - | 11.277 | 12.831 | 13.104 | 13.349 | 13.636 | Continuing | Continuing |
| • WPN/3113: *SSTD* | 5.910 | 5.240 | 6.353 | - | 6.353 | 5.712 | 5.766 | 5.673 | 5.550 | Continuing | Continuing |

**Remarks**

**D. Acquisition Strategy**

CAT Program: The Program completed a Systems Requirements Review (SRR) and Preliminary Design Review (PDR) on the Engineering Development Model (EDM) design. ARL Penn State (ARL/PSU) has completed a Technical Data Package (TDP) that can be used in the future system builds. Funding in FY18 was used to complete QRA of salvo software and conduct CT-5 contract test, update and refine the CATs to ensure they were ready for fleet use. Funding in FY19 is for EDM support and ATT post deployment EDM maintenance.

TWS Program: Development and production of the new sensors was conducted by ULTRA/3Phoenix. Five complete sensor sets have been delivered. Ready-stowage racks, and fire control systems have been developed by Pacific Engineering Incorporated (PEI) and In-Depth Engineering, respectively. System integration supported fabrication and fielding of the five complete systems. Funding in FY18 was used to update and refine TWS to ensure the five systems were ready for Fleet deployment. Funding in FY19 is for EDM support and TWS post deployment software and hardware engineering review.

**E. Performance Metrics**

Torpedo Effectiveness for the CAT
Torpedo Reliability and Availability for the CAT
Torpedo Detection Classification and Localization (TDCL)
False Alert Rate TDCL probability of correct classification
TWS System Reliability and Availability

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603506N / *Surface Ship Torpedo Defense* | Project (Number/Name)<br>0225 / *Surface Ship Torpedo Defense (SSTD)* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Systems Engineering | WR | NUWC : Newport, RI | 44.311 | 3.620 | Nov 2016 | 2.400 | Nov 2017 | 1.100 | Nov 2018 | - | | 1.100 | 0.000 | 51.431 | - |
| Systems Engineering ATT Dev. | C/CPFF | PSU/ARL : State College, PA | 281.016 | 21.227 | Dec 2016 | 4.000 | Dec 2017 | 2.000 | Dec 2018 | - | | 2.000 | 0.000 | 308.243 | - |
| Systems Engineering | C/CPFF | JHU/APL : Baltimore , MD | 1.740 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.740 | - |
| Systems Engineering Warhead Dev. | WR | NSWC : Indian Head, MD | 73.700 | 5.490 | Nov 2016 | 1.100 | Nov 2017 | 1.100 | Nov 2018 | - | | 1.100 | 0.000 | 81.390 | - |
| Systems Engineering | WR | NUWC : Keyport,WA | 53.982 | 5.649 | Nov 2016 | 1.000 | Nov 2017 | 1.200 | Nov 2018 | - | | 1.200 | 0.000 | 61.831 | - |
| Systems Engineering TDCL | C/CPFF | Ultra : Braintree, MA | 11.640 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 11.640 | Continuing |
| Systems Engineering ATT | WR | ONR : Arlington, VA | 1.680 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.680 | - |
| Systems Engineering TDCL | C/CPFF | AAC : Hauppage, NY | 4.480 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 4.480 | Continuing |
| Systems Engineering | WR | OPTEVFOR : Norfolk, VA | 2.090 | 0.340 | Feb 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.430 | - |
| Systems Engineering | C/CPFF | ArgonST : Manassas, VA | 0.800 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.800 | Continuing |
| Systems Engineering TDCL | WR | NSWC : Dahlgren, VA | 9.865 | 0.167 | Nov 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 10.032 | Continuing |
| Systems Engineering TDCL | WR | SPAWAR : San Diego, CA | 10.148 | 0.970 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 11.118 | Continuing |
| Systems Engineering | C/CPFF | UT/ARL : Arlington, TX | 0.600 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.600 | Continuing |
| Systems Engineering | C/CPFF | Alion : Bridgeport, CT | 14.858 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 14.858 | Continuing |
| Systems Engineering | WR | NUWC DET : Norfolk, VA | 33.181 | 8.600 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 41.781 | - |
| Systems Development | C/CPFF | 3 Phoenix : Fairfax, VA | 103.545 | 19.000 | Dec 2016 | 3.974 | Dec 2017 | 1.100 | Dec 2018 | - | | 1.100 | 0.000 | 127.619 | Continuing |
| Integrated Logistic Spt | WR | NSWC Crane : Crane, IN | 1.064 | 0.049 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.113 | Continuing |
| Systems Engineering | C/CPFF | PEI : Roca, NE | 3.745 | 1.000 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 4.745 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603506N / *Surface Ship Torpedo Defense* | Project (Number/Name)<br>0225 / *Surface Ship Torpedo Defense (SSTD)* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Systems Engineering | WR | CARDEROCK : Bethesda, MD | 1.335 | 0.295 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.630 | - |
| Systems Engineering | C/CPFF | CGI : Washington, DC | 0.200 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.200 | - |
| Systems Engineering | C/BA | Dam Neck : Virginia Beach, VA | 0.022 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.022 | - |
| Systems Engineering | C/BA | NSWC Panama City : Panama City, FL | 0.255 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.255 | - |
| Systems Engineering | C/BA | Devron 26 : Not Specified | 0.139 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.139 | - |
| Systems Engineering | WR | Puget Sounds : Norfolk, VA | 0.200 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.200 | - |
| Systems Engineering | WR | NAVAIR (NAWC WD) : Patuxent River, MD | 0.000 | 0.140 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.140 | - |
| Systems Engineering | WR | NORFOLK SHIPYARD : Norfolk, VA | 0.000 | 0.150 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.150 | - |
| Systems Engineering | WR | NORFOLK PLANNING YARD : Norfolk, VA | 0.000 | 0.090 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.090 | - |
| | | **Subtotal** | 654.596 | 66.787 | | 12.474 | | 6.500 | | - | | 6.500 | 0.000 | 740.357 | N/A |

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Earned Value Mgmt Spt | C/CPAF | Pioneer : Virigina | 0.050 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.050 | - |
| Program Management Support | C/FFP | EG&G : Gaithersburg, Md. | 2.846 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.846 | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603506N / *Surface Ship Torpedo Defense* | **Project (Number/Name)**<br>0225 / *Surface Ship Torpedo Defense (SSTD)* |

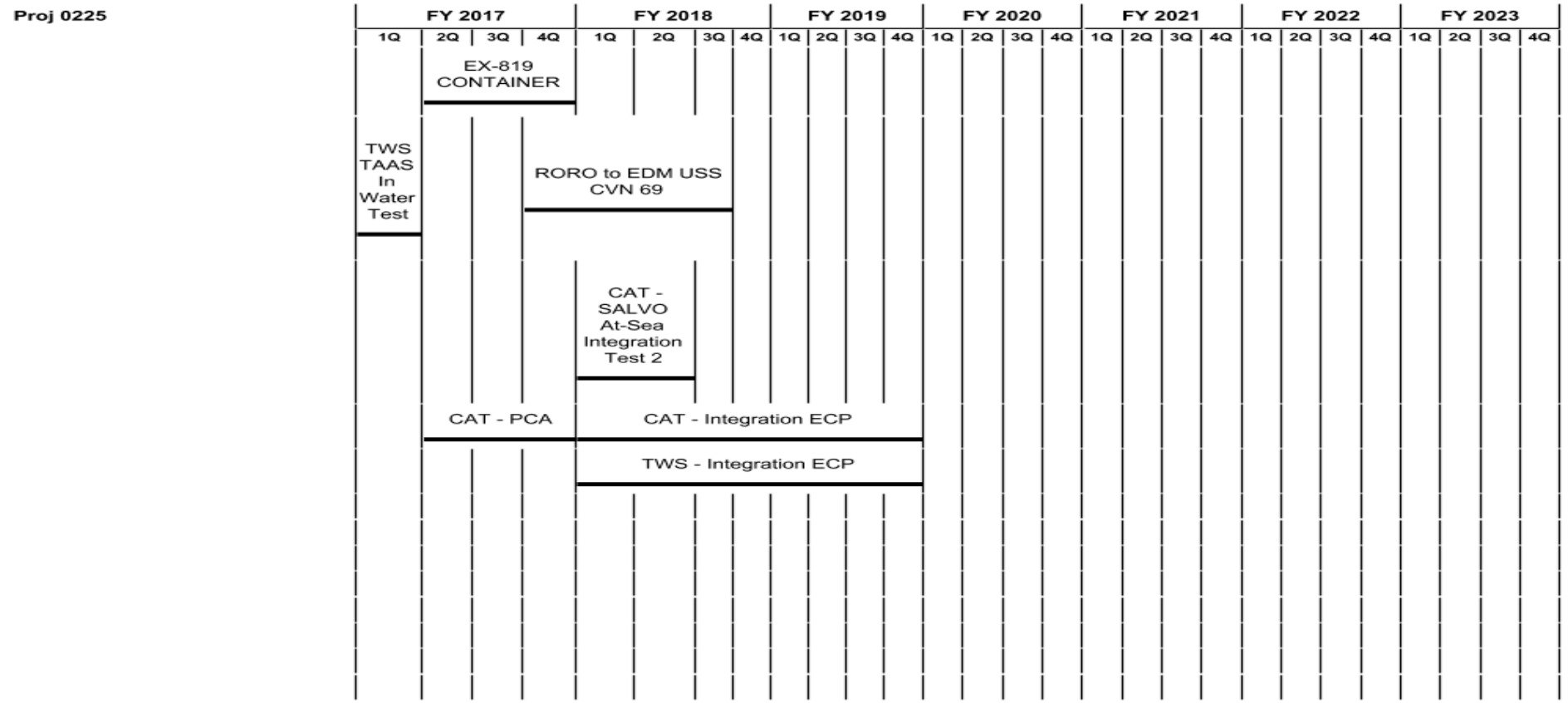
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DAWDF | Various | Not Specified : Not Specified | 0.237 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.237 | Continuing |
| Program Management Support | C/CPAF | Tech-Marine : Washington, DC | 9.930 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 9.930 | Continuing |
| Travel | Various | PMS 415 : Not Specified | 1.044 | 0.100 | Nov 2016 | 0.100 | Nov 2017 | 0.100 | Nov 2018 | - | | 0.100 | 0.000 | 1.344 | Continuing |
| Program Management Support | C/CPFF | SPA : Alexandria, VA | 0.575 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.575 | Continuing |
| Program Management Support | C/CPAF | Booz Allen : Washington, DC | 9.988 | 2.985 | Feb 2017 | 2.400 | Feb 2018 | 1.970 | Feb 2019 | - | | 1.970 | 0.000 | 17.343 | - |
| Program Management Support | C/CPAF | Alion : Washington, DC | 0.400 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.400 | - |
| | | **Subtotal** | 25.070 | 3.085 | | 2.500 | | 2.070 | | - | | 2.070 | 0.000 | 32.725 | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 679.666 | 69.872 | | 14.974 | | 8.570 | | - | | 8.570 | 0.000 | 773.082 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603506N / *Surface Ship Torpedo Defense* | **Project (Number/Name)**<br>0225 / *Surface Ship Torpedo Defense (SSTD)* |




*2019PB - 0603506N - 0225*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603506N / *Surface Ship Torpedo Defense* | **Project (Number/Name)**<br>0225 / *Surface Ship Torpedo Defense (SSTD)* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 0225*** | | | | |
| EX-819 CONTAINER | 2 | 2017 | 4 | 2017 |
| RORO to EDM USS CVN 69 | 4 | 2017 | 3 | 2018 |
| TWS - TAAS In Water Test | 1 | 2017 | 1 | 2017 |
| CAT - SALVO At-Sea Integration Test 2 | 1 | 2018 | 2 | 2018 |
| CAT - Integration ECP | 1 | 2018 | 4 | 2019 |
| CAT - PCA | 2 | 2017 | 4 | 2017 |
| TWS - Integration ECP | 1 | 2018 | 4 | 2019 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603512N *I Carrier Systems Development* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 61.644 | 7.516 | 9.296 | 5.440 | - | 5.440 | 5.401 | 5.531 | 5.637 | 5.778 | Continuing | Continuing |
| 3216: *Tactical Support Center-Integration* | 36.849 | 6.943 | 7.636 | 4.248 | - | 4.248 | 4.385 | 4.483 | 4.566 | 4.670 | Continuing | Continuing |
| 4005: *In-Service Carrier Systems Development* | 24.795 | 0.573 | 1.660 | 1.192 | - | 1.192 | 1.016 | 1.048 | 1.071 | 1.108 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

The FY 2019 funding request was reduced by $.033 million to reflect the Department of Navy's effort to support the Office of Management and Budget directed reforms for Efficiency and Effectiveness that include a lean, accountable, more efficient government.

This Navy unique program addresses all technology areas associated with Navy/Marine Corps aircraft operations aboard ships. The program includes:

- (3216) - The AN/SQQ-34 Aircraft Carrier Tactical Support Center (CV-TSC) delivers Anti-Submarine Warfare (ASW) and Surface Warfare (SUW) combat capability to the Aircraft Carrier. CV-TSC integrates sensor data from Off-Board Aircraft, Organic Platform Sensors, Link-16 Track Data, Ship Self Defense System (SSDS) Track Data, Global Command and Control System (GCCS) Over-the-Horizon Track Data, and Environmental and Threat Databases to assess the threat and assist the Tactical Action Officer (TAO) and Composite Warfare Commander (CWC) to effectively employ overall CVN self-defense capabilities. CV-TSC generates real-time ASW/SUW information and recommendations, tactical planning and employment of ASW/SUW aircraft, ASW/SUW sensor data processing and analysis, and distribution of tactically significant data. Aircraft supported include: MH-60R/S, P-8, MQ-4C Triton, and future ASW/SUW aircraft.

Beginning in FY 2016 and concluding in FY 2018, Project 3216 is supporting the design and development of a multi-application, cross-platform defense capability as directed by the Chief of Naval Operations (CNO) and Assistant Secretary of the Navy Research, Development & Acquisition (ASN (RDA)) via the Task Force Cyber Awakening (TFCA) Advisory Board.

- (4005) - The In-Service Carrier Systems Development Demonstration and Validation program exploits available technologies to deliver an affordable, robust, operator-friendly automation control environment for Navy Aircraft Carrier shipboard equipment. The program provides the system architecture, requirements/specification development, technology selection, software development (including software baseline), as well as land-based and shipboard testing of new technologies to improve shipboard operations and to reduce workload, manpower requirements, and Total Ownership Costs (TOC).

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | Date: February 2018 |
|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | R-1 Program Element (Number/Name)<br>PE 0603512N *I Carrier Systems Development* | | |
| **B. Program Change Summary ($ in Millions)** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** |
| Previous President's Budget | 7.605 | 9.296 | 5.918 | - | 5.918 |
| Current President's Budget | 7.516 | 9.296 | 5.440 | - | 5.440 |
| Total Adjustments | -0.089 | 0.000 | -0.478 | - | -0.478 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -0.089 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | -0.033 | - | -0.033 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -0.445 | - | -0.445 |

**Change Summary Explanation**

Funding: The net FY 2019 decrease is based on the Project 3216 Boundary Defense Capability (BDC) efforts concluding in this PE. However, the FY 2019 planned increase to the Project 3216 CV-TSC budget is the result of additional efforts initiated in FY 2019 (i.e. definition and development for FCR-4).

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603512N / *Carrier Systems Development* | Project (Number/Name)<br>3216 / *Tactical Support Center-Integration* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3216: *Tactical Support Center-Integration* | 36.849 | 6.943 | 7.636 | 4.248 | - | 4.248 | 4.385 | 4.483 | 4.566 | 4.670 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The CV-TSC project delivers ASW and SUW combat capability to the Aircraft Carrier. CV-TSC integrates sensor data from Off-Board Aircraft, Organic Platform Sensors, Link-16 Track Data, SSDS Track Data, Global Command and Control System (GCCS) Over-the-Horizon Track Data, and Environmental and Threat Databases to assess the threat and assist the TAO and CWC to effectively employ overall CVN self-defense capabilities. CV-TSC generates real-time ASW/SUW information and recommendations, tactical planning and employment of ASW/SUW aircraft, ASW/SUW sensor data processing and analysis, and distribution of tactically significant data. Aircraft supported include: MH-60R/S, P-8, MQ-4C Triton, and future ASW/SUW aircraft. System development is accomplished through the following initiatives:
1) Maintaining interoperability with the local CVN warfare systems through current and future interfaces;
2) Continuing to support mission data exchange and tactical control with current and future ASW/SUW aircraft and their mission systems;
3) Improving track and sensor processing and analysis techniques as new track and sensor data becomes available;
4) Improving mission planning support for the ASW/SUW missions conducted from the CVN;
5) Improving data recording, reconstruct, and distribution to meet the decreasing timelines associated with getting tactically significant data to other end users both on and off platform;
6) Improving embedded simulation and training capabilities to enable operator proficiencies; and
7) Implementing cyber-security measures.

This project also provides development of Boundary Defense Capability (Cybersecurity) capabilities (from FY 2016 to FY 2018): The purpose of this effort is to define and develop enterprise Hull Mechanical & Electrical (HM&E) System cybersecurity solutions that will provide: protections from cyber-attacks such as boundary defense capabilities that will protect threats entering and leaving HM&E systems, physical protections, message authentication and encryption methods; Detection solutions for system anomalies and attacks at the boundaries, on hosts, networks and backplanes; and provide for operator awareness (e.g. malware detection, file integrity verification, etc.); Reaction solutions that will enable operator and system responses to an attacks; and Recovery methods that will enable for a system to quickly get back to a good known state. Planning will also commence for the integration of cyber solutions into specific HM&E control systems (e.g. Machinery Control, Steering Control, etc.).

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** CV-TSC Development / Integration / Test / Certification | 3.731 | 4.222 | 4.248 | 0.000 | 4.248 |
| ***Articles:*** | - | - | - | - | - |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603512N / *Carrier Systems Development* | **Project (Number/Name)**<br>3216 / *Tactical Support Center-Integration* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Description:*** CV-TSC's evolutionary acquisition approach to developing, testing, certifying, and fielding system upgrades and cyber-security patches is implemented through phased Fleet Capability Releases (FCR).<br><br>***FY 2018 Plans:***<br>- Complete the requirements definition phase for FCR-3 and commence the system engineering for and development of FCR-3.<br>- Conduct incremental requirements, design, and test reviews of FCR-3.<br>- Update System Engineering Plan (SEP).<br>- Transition requirements into a systems engineering modeling tool.<br>- Modify interface requirement specifications for changing interfaces.<br>- Start the Transition Information Assurance (IA) Accreditation to Risk Management Framework (RMF).<br><br>***FY 2019 Base Plans:***<br>- Complete the development phase for FCR-3.<br>- Initiate the requirements definition phase and development efforts for FCR-4.<br>- Complete certifications required for fielding, to include IA Accreditation, ISNS and CANES Certifications, PEO IWS Element Certification, and CST Certification.<br>- Complete the Transition Information Assurance (IA) Accreditation to Risk Management Framework (RMF). Prioritize capability improvements to Public Key Enforcement (PKE) compliance, interoperability with multiple variants of SSDS PLA, and the Common Data Link System (CDLS) multilink.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2018 to FY 2019 Increase/Decrease Statement: FY 2019 planned increase is the result of additional efforts initiated in FY 2019 (i.e. definition and development for FCR-4) and is attributable to general inflation rate adjustments. | | | | | |
| ***Title:*** NAVSEA Boundary Defense Capability (Cybersecurity) | 3.212 | 3.414 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** The purpose of this effort is to define and develop enterprise Hull Mechanical & Electrical (HM&E) System cybersecurity solutions that will provide: protections from cyber-attacks such as boundary defense capabilities that will protect threats entering and leaving HM&E systems, physical protections, message | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603512N / *Carrier Systems Development* | **Project (Number/Name)**<br>3216 / *Tactical Support Center-Integration* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| authentication and encryption methods; Detection solutions for system anomalies and attacks at the boundaries, on hosts, networks and backplanes; and provide for operator awareness (e.g. malware detection, file integrity verification, etc.); Reaction solutions that will enable operator and system responses to an attacks; and Recovery methods that will enable for a system to quickly get back to a good known state. Planning will also commence for the integration of cyber solutions into specific HM&E control systems (e.g. Machinery Control, Steering Control, etc.).<br><br>The development of a cyber-resilient HM&E architecture will include the integration of cybersecurity solutions and system engineering processes to individual HM&E Systems and their Components to ensure a consistent cyber security posture across the entire HM&E Enclave. Development of enterprise HM&E risk management processes will occur, to include the following: a vulnerability assessment and management process across the HM&E Enclave and a methodology to support the execution of the Risk Management Framework and Cybersafe Assessments.<br><br>***FY 2018 Plans:***<br>Continue design and development of multi-application, cross-platform cybersecurity solutions for control system enclaves, followed by engineering for CVN 68 Class integration.<br>- Initiate non-recurring engineering efforts for HM&E Control Systems.<br>- Perform engineering and planning for Boundary Defense Capability Temporary Alterations.<br>- Develop infra-structure, processes and procedures in support of Risk Management Framework (RMF) and Cybersafe.<br>- Perform system change engineering and analysis for upgrading systems to supported operating systems.<br>- Develop Cybersecurity Situational Awareness strategy for CVN 68 Class<br><br>***FY 2019 Base Plans:***<br>N/A<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2018 to FY 2019 Increase/Decrease Statement: The FY 2019 decrease is based on BDC efforts concluding in this PE. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 6.943 | 7.636 | 4.248 | 0.000 | 4.248 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603512N / *Carrier Systems Development* | **Project (Number/Name)**<br>3216 / *Tactical Support Center-Integration* |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • OPN/2176: *Undersea Warfare Support Equipment (N98/CV-TSC only)* | 0.315 | 0.338 | 0.334 | - | 0.334 | 0.343 | 0.353 | 0.359 | 0.367 | Continuing | Continuing |

**Remarks**

**D. Acquisition Strategy**

CV-TSC Development/Integration:
CV-TSC utilizes an incremental development approach that aims to deliver frequent capability updates to the Fleet. This approach allows required capability to be delivered to address emerging Fleet needs and provides frequent opportunities to ensure interoperability is synchronized with the Ship Self Defense System (SSDS) Advanced Capability Builds (ACBs). The acquisition strategy places heavy emphasis on the use of open architecture best practices to ensure ease of upgrades and to make developed products available to other platforms.

NAVSEA Boundary Defense Capability (Cybersecurity):
Investigate, demonstrate, and implement multi-application, cross-platform cybersecurity solutions for HM&E control system enclaves, followed by engineering for CVN 68 Class integration. Execute non-recurring engineering efforts for HM&E Control Systems. Perform engineering and planning for Boundary Defense Capability Temporary Alterations.

**E. Performance Metrics**

CV-TSC Development/Integration:
- Achieve Configuration Control Board (CCB) certification for installation of CV-TSC Build 8.0 software version.
- Achieve Platform Information Technology (PIT) Information Assurance (IA) accreditation of CV-TSC Build 8.0 software version.
- Achieve Consolidate Afloat Network Enterprise System (CANES) interoperability certification of CV-TSC Build 8.0 software version.
- Achieve element certification of CV-TSC Build 8.0 software version. - Achieve Combat System test certification of CV-TSC Build 8.0 software version.

NAVSEA Boundary Defense Capability (Cybersecurity):
- Define and develop cross-platform control system cybersecurity requirements.
- Define and develop cross-platform control system cybersecurity risk management processes.
- Define and develop a set of cross-platform control system cybersecurity boundary defense solutions.
- Define and develop a set of cross-platform, centralized, systems-level cybersecurity solutions.
- Define and develop a set of cross-platform, element-level cybersecurity protections.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603512N / *Carrier Systems Development* | Project (Number/Name)<br>3216 / *Tactical Support Center-Integration* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Engineering / H/W & S/W Devel / Integration | WR | NAWC/Pax River : MD | 0.875 | 0.100 | Nov 2016 | 0.100 | Nov 2017 | 0.100 | Nov 2018 | - | | 0.100 | Continuing | Continuing | Continuing |
| Engineering / H/W & S/W Devel / Integration | WR | NRL : DC | 0.325 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.325 | - |
| Engineering / H/W & S/W Devel / Integration | WR | NSWC/Carderock : MD | 2.250 | 0.400 | Jan 2017 | 0.400 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 3.050 | - |
| Engineering / H/W & S/W Devel / Integration | WR | NSWC/Dahlgren : VA | 0.100 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.100 | - |
| Engineering / H/W & S/W Devel / Integration | WR | NUWC/Keyport : WA | 20.770 | 2.248 | Nov 2016 | 2.541 | Oct 2017 | 2.846 | Nov 2018 | - | | 2.846 | Continuing | Continuing | Continuing |
| System Eng / S/W Development | C/CPFF | Adaptive Methods : VA | 2.654 | 0.453 | Dec 2016 | 0.563 | Dec 2017 | 0.595 | Dec 2018 | - | | 0.595 | Continuing | Continuing | Continuing |
| System Eng / S/W Development | C/CPFF | JHU/APL : MD | 0.250 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.250 | - |
| System Eng / S/W Development | WR | SPAWAR : CA | 4.160 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 4.160 | - |
| Engineering / H/W & S/W Development | C/CPFF | VAR* : VAR* | 1.038 | 0.250 | Jan 2017 | 0.338 | Dec 2017 | 0.338 | Dec 2018 | - | | 0.338 | Continuing | Continuing | Continuing |
| Boundary Defense Capability Design/ Development | WR | NSWC/Philadelphia : PA | 1.026 | 1.500 | Oct 2016 | 1.520 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 4.046 | - |
| Boundary Defense Capability Design/ Development | C/CPFF | VAR* : VAR* | 0.930 | 1.712 | Dec 2016 | 1.894 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 4.536 | - |
| | | **Subtotal** | 34.378 | 6.663 | | 7.356 | | 3.879 | | - | | 3.879 | Continuing | Continuing | N/A |

**Remarks**

*Consists of multiple performing activities with funding for each not greater than $1M per year.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603512N / *Carrier Systems Development* | **Project (Number/Name)**<br>3216 / *Tactical Support Center-Integration* |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Test and Certification | WR | NUWC//Keyport : WA | 1.880 | 0.225 | Nov 2016 | 0.225 | Oct 2017 | 0.314 | Nov 2018 | - | | 0.314 | Continuing | Continuing | Continuing |
| Test and Certification | WR | NUWC/Newport : RI | 0.125 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.125 | - |
| | | **Subtotal** | 2.005 | 0.225 | | 0.225 | | 0.314 | | - | | 0.314 | Continuing | Continuing | N/A |

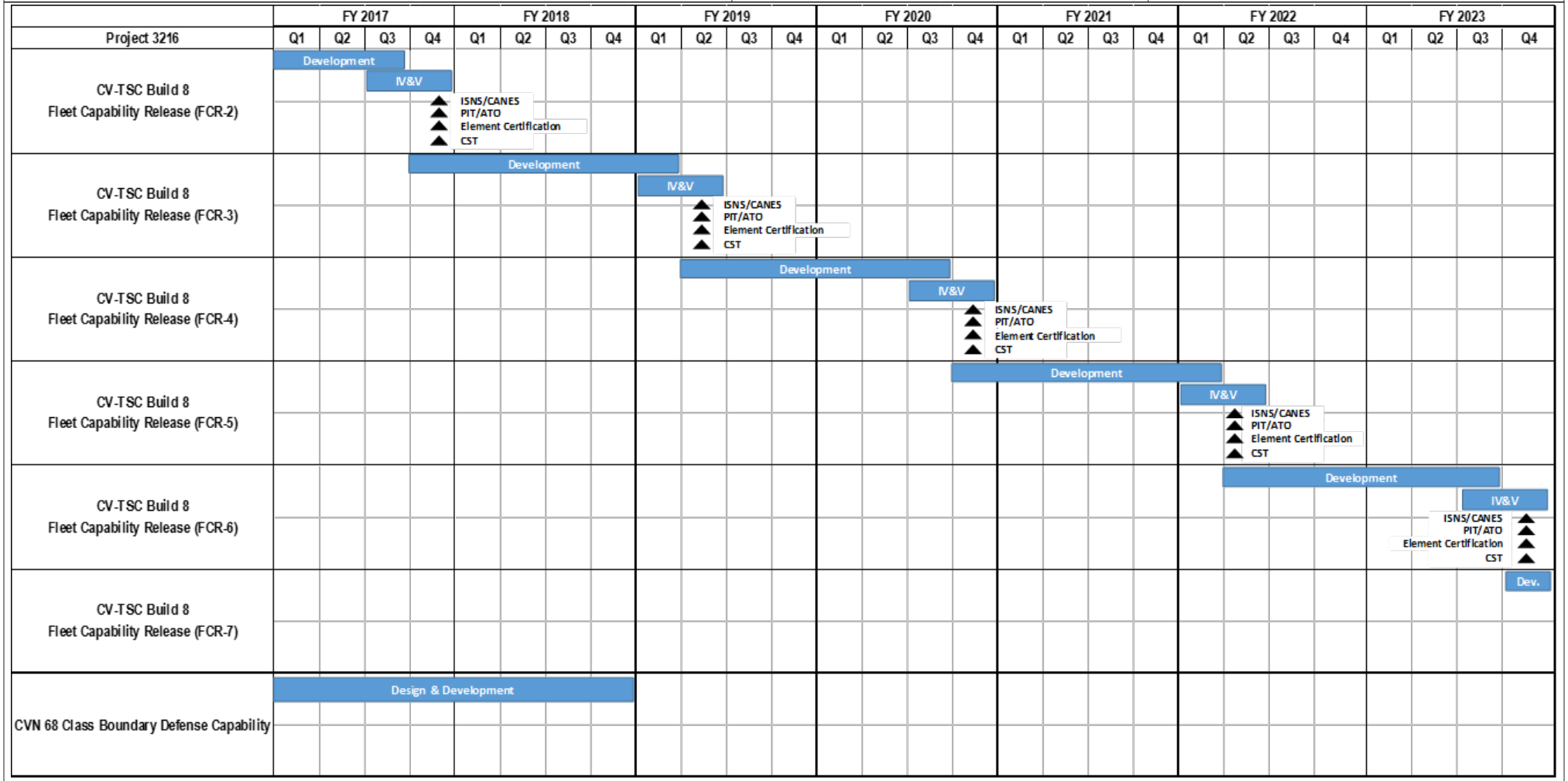
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management Support | C/CPAF | BAE Systems : MD | 0.411 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.411 | - |
| Program Management Support | C/CPIF | CGI Federal : VA | 0.055 | 0.055 | Nov 2016 | 0.055 | Nov 2017 | 0.055 | Dec 2018 | - | | 0.055 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.466 | 0.055 | | 0.055 | | 0.055 | | - | | 0.055 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 36.849 | 6.943 | | 7.636 | | 4.248 | | - | | 4.248 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603512N / *Carrier Systems Development* | **Project (Number/Name)**<br>3216 / *Tactical Support Center-Integration* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603512N / *Carrier Systems Development* | **Project (Number/Name)**<br>3216 / *Tactical Support Center-Integration* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***CV-TSC Build 8 Software Fleet Capability Release*** | | | | |
| CV-TSC Build 8 FCR-2: CV-TSC Build 8 FCR-2 Development | 1 | 2017 | 3 | 2017 |
| CV-TSC Build 8 FCR-2: CV-TSC Build 8 FCR-2 IV&V | 3 | 2017 | 4 | 2017 |
| CV-TSC Build 8 FCR-2: CV-TSC Build 8 FCR-2 PIT/ATO | 4 | 2017 | 4 | 2017 |
| CV-TSC Build 8 FCR-2: CV-TSC Build 8 FCR-2 ISNS / CANES Certification | 4 | 2017 | 4 | 2017 |
| CV-TSC Build 8 FCR-2: CV-TSC Build 8 FCR-2 Element Certification | 4 | 2017 | 4 | 2017 |
| CV-TSC Build 8 FCR-2: CV-TSC Build 8 FCR-2 CVN-78 Combat System Test (CST) | 4 | 2017 | 4 | 2017 |
| CV-TSC Build 8 FCR-3: CV-TSC Build 8 FCR-3 Development | 4 | 2017 | 1 | 2019 |
| CV-TSC Build 8 FCR-3: CV-TSC Build 8 FCR-3 IV&V | 1 | 2019 | 2 | 2019 |
| CV-TSC Build 8 FCR-3: CV-TSC Build 8 FCR-3 PIT/ATO | 2 | 2019 | 2 | 2019 |
| CV-TSC Build 8 FCR-3: CV-TSC Build 8 FCR-3 ISNS / CANES Certification | 2 | 2019 | 2 | 2019 |
| CV-TSC Build 8 FCR-3: CV-TSC Build 8 FCR-3 Element Certification | 2 | 2019 | 2 | 2019 |
| CV-TSC Build 8 FCR-3: CV-TSC Build 8 FCR-3 Combat System Test (CST) | 2 | 2019 | 2 | 2019 |
| CV-TSC Build 8 FCR-4: CV-TSC Build 8 FCR-4 Development | 2 | 2019 | 3 | 2020 |
| CV-TSC Build 8 FCR-4: CV-TSC Build 8 FCR-4 IV&V | 3 | 2020 | 4 | 2020 |
| CV-TSC Build 8 FCR-4: CV-TSC Build 8 FCR-4 PIT/ATO | 4 | 2020 | 4 | 2020 |
| CV-TSC Build 8 FCR-4: CV-TSC Build 8 FCR-4 ISNS / CANES Certification | 4 | 2020 | 4 | 2020 |
| CV-TSC Build 8 FCR-4: CV-TSC Build 8 FCR-4 Element Certification | 4 | 2020 | 4 | 2020 |
| CV-TSC Build 8 FCR-4: CV-TSC Build 8 FCR-4 Combat System Test (CST) | 4 | 2020 | 4 | 2020 |
| CV-TSC Build 8 FCR-5: CV-TSC Build 8 FCR-5 Development | 4 | 2020 | 1 | 2022 |
| CV-TSC Build 8 FCR-5: CV-TSC Build 8 FCR-5 IV&V | 1 | 2022 | 2 | 2022 |
| CV-TSC Build 8 FCR-5: CV-TSC Build 8 FCR-5 PIT/ATO | 2 | 2022 | 2 | 2022 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603512N / *Carrier Systems Development* | **Project (Number/Name)**<br>3216 / *Tactical Support Center-Integration* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| CV-TSC Build 8 FCR-5: CV-TSC Build 8 FCR-5 ISNS / CANES Certification | 2 | 2022 | 2 | 2022 |
| CV-TSC Build 8 FCR-5: CV-TSC Build 8 FCR-5 Element Certification | 2 | 2022 | 2 | 2022 |
| CV-TSC Build 8 FCR-5: CV-TSC Build 8 FCR-5 Combat System Test (CST) | 2 | 2022 | 2 | 2022 |
| CV-TSC Build 8 FCR-6: CV-TSC Build 8 FCR-6 Development | 2 | 2022 | 3 | 2023 |
| CV-TSC Build 8 FCR-6: CV-TSC Build 8 FCR-6 IV&V | 3 | 2023 | 4 | 2023 |
| CV-TSC Build 8 FCR-6: CV-TSC Build 8 FCR-6 PIT/ATO | 4 | 2023 | 4 | 2023 |
| CV-TSC Build 8 FCR-6: CV-TSC Build 8 FCR-6 ISNS / CANES Certification | 4 | 2023 | 4 | 2023 |
| CV-TSC Build 8 FCR-6: CV-TSC Build 8 FCR-6 Element Certification | 4 | 2023 | 4 | 2023 |
| CV-TSC Build 8 FCR-6: CV-TSC Build 8 FCR-6 Combat System Test (CST) | 4 | 2023 | 4 | 2023 |
| CV-TSC Build 8 FCR-7: CV-TSC Build 8 FCR-7 Development | 4 | 2023 | 4 | 2023 |
| ***CVN 68 Class Boundary Defense Capability*** | | | | |
| CVN 68 Class Boundary Defense Capability: CVN 68 Class Boundary Defense Capability Design & Development | 1 | 2017 | 4 | 2018 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603512N / *Carrier Systems Development* | Project (Number/Name)<br>4005 / *In-Service Carrier Systems Development* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4005: *In-Service Carrier Systems Development* | 24.795 | 0.573 | 1.660 | 1.192 | - | 1.192 | 1.016 | 1.048 | 1.071 | 1.108 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The In-Service Carrier Systems Demonstration and Validation program exploits available technologies to deliver an affordable, robust, operator-friendly automation control environment for Navy Aircraft Carrier shipboard equipment. The program provides the system architecture, requirements/specification development, technology selection, software development (including software baseline), as well as land-based and shipboard testing of new technologies to improve shipboard operations and to reduce workload, manpower requirements, and Total Ownership Costs as well as addressing equipment obsolescence issues. Initial technologies include the Ship Control System Governor Software Development, Tank Preservation, Uninterruptible Power Supply (UPS) Replacements, Advanced Damage Control System (ADCS), Weapons Elevator Control Accumulator Replacement, the Integrated Condition Assessment System, the On-Machine I/O development for LPAPs and LPAP air end redesign, Modular Refrigeration Unit (MRU). Demonstration technologies include Advanced Damage Control System (ADCS) software improvements, Input/Output Controller (IOC) Replacement, Fleet Wireless Personal digital Assistant (PDA), Weapons Elevator Laser Positioning System, Legacy Steering Interface upgrades, CVN Integrated Topside Design (ITD) location option evaluation tools, Antenna to Antenna coupling analysis tools, and Passive countermeasures System (PCMS) alternate measurement capability. Wireless systems, smart sensors, lighting systems, knowledge-based systems, automated casualty control, automated technology for workload reduction, linked smart devices, common software tools for interoperability, and self-healing network are technologies being considered for future applications including the following: Integrated Bridge control Data Logger, C4I Network Performance Modeling and Analysis, Network Data Logger Device, Portable Communication System (PCS) proof of concept, Ship Control System (SCS) Onboard trainer, CVN 78 class platform support for Joint Strike Fighter Integration, Development of a Standardized tool to be used to perform structural analyses to assess the adequacy of corroded and degraded structure.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** In-Service Carrier Systems Development | 0.573 | 1.660 | 1.192 | 0.000 | 1.192 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Fiscal Year 2018 plans include continued support to Aircraft Carrier technologies. Modifications, upgrades and development of systems and software will be ongoing in support of In-Service aircraft carrier modernization initiatives and TOC reduction initiatives as well as addressing equipment obsolescence issues. | | | | | |
| ***FY 2019 Base Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603512N / *Carrier Systems Development* | **Project (Number/Name)**<br>4005 / *In-Service Carrier Systems Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Fiscal Year 2019 plans include continued support to Aircraft Carrier technologies. Modifications, upgrades and development of systems and software will be ongoing in support of In-Service aircraft carrier modernization initiatives and TOC reduction initiatives as well as addressing equipment obsolescence issues.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Program decrease due to completion of large LPAP projects (LPAP On-Machine I/O and LPAP Air End Redesign) in FY18. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.573 | 1.660 | 1.192 | 0.000 | 1.192 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Investigate, demonstrate, and implement available technologies to deliver a robust, operator-friendly automation control environment for Navy Aircraft Carrier shipboard equipment to reduce workload, manpower requirements, and Total Ownership Costs (TOC).

**E. Performance Metrics**

Successfully complete Ship Control System Governor Software Development, AC Plant Model Capacity Optimization, Uninterruptible Power Supply (UPS) Replacements, Advanced Damage Control System (ADCS) Software Improvements, Automatic Fire Sensing and Suppression System/Flooding and Casualty Control Software (AFSSS/FCCS) Software Development Test, Input/Output Controller (IOC) replacement demonstration, Tank Preservation models, Weapons Elevator Laser Positioning demonstration, Legacy Steering Interface Upgrades, CVN Integrated Topside Design (ITD) location option evaluation tool development, Antenna to Antenna coupling analysis tool development, Universal Portable Command and Control Unit (PCCU) development, Ship Control System (SCS) Trainer, Integrated Bridge Control Data Logger, Weapons Elevator Control Accumulator Replacement, and C4I Network Performance Requirements Modeling and Analysis.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603512N / *Carrier Systems Development* | Project (Number/Name)<br>4005 / *In-Service Carrier Systems Development* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ship Integration | WR | NAVSEA : Phil | 2.648 | 0.215 | Nov 2016 | 0.733 | Nov 2017 | 0.537 | Nov 2018 | - | | 0.537 | 0.000 | 4.133 | - |
| Ship Integration | WR | NAVSEA : Dahlgren | 0.197 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.197 | - |
| Ship Integration | WR | NAVSEA : Carderock | 0.225 | 0.000 | | 0.100 | Nov 2017 | 0.100 | Nov 2018 | - | | 0.100 | 0.000 | 0.425 | - |
| | | **Subtotal** | 3.070 | 0.215 | | 0.833 | | 0.637 | | - | | 0.637 | 0.000 | 4.755 | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Software Development | WR | NAVSEA : Phil | 8.282 | 0.050 | Nov 2016 | 0.054 | Nov 2017 | 0.050 | Nov 2018 | - | | 0.050 | 0.000 | 8.436 | - |
| Program Management Support | WR | NAVSEA : Phil | 3.227 | 0.050 | Nov 2016 | 0.150 | Nov 2017 | 0.100 | Nov 2018 | - | | 0.100 | 0.000 | 3.527 | - |
| Training Development | WR | NAVSEA : Phil | 1.365 | 0.000 | Nov 2016 | 0.050 | Nov 2017 | 0.050 | Nov 2018 | - | | 0.050 | 0.000 | 1.465 | - |
| Integrated Logistics Support | WR | NAVSEA : Phil | 1.604 | 0.050 | Nov 2016 | 0.100 | Nov 2017 | 0.085 | Nov 2018 | - | | 0.085 | 0.000 | 1.839 | - |
| Software Development | WR | NAVSEA : Dahlgren | 0.308 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.308 | - |
| Program Management Support | WR | NAVSEA : Dahlgren | 0.317 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.317 | - |
| Program Management Support | WR | NAVSEA : Carderock | 0.050 | 0.050 | Nov 2016 | 0.050 | Nov 2017 | 0.050 | Nov 2018 | - | | 0.050 | 0.000 | 0.200 | - |
| | | **Subtotal** | 15.153 | 0.200 | | 0.404 | | 0.335 | | - | | 0.335 | 0.000 | 16.092 | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Developmental Test & Evaluation | WR | SPAWAR : Atlantic | 0.214 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.214 | - |
| Developmental Test & Evaluation | WR | NAVSEA : Carderock | 0.175 | 0.050 | Nov 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.225 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603512N / *Carrier Systems Development* | Project (Number/Name)<br>4005 / *In-Service Carrier Systems Development* | |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Developmental Test & Evaluation | WR | NAVSEA : Phil | 5.914 | 0.108 | Nov 2016 | 0.423 | Nov 2017 | 0.220 | Nov 2018 | - | | 0.220 | Continuing | Continuing | Continuing |
| Developmental Test & Evaluation | WR | NAVSEA : Dahlgren | 0.261 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.261 | - |
| | | **Subtotal** | 6.564 | 0.158 | | 0.423 | | 0.220 | | - | | 0.220 | Continuing | Continuing | N/A |

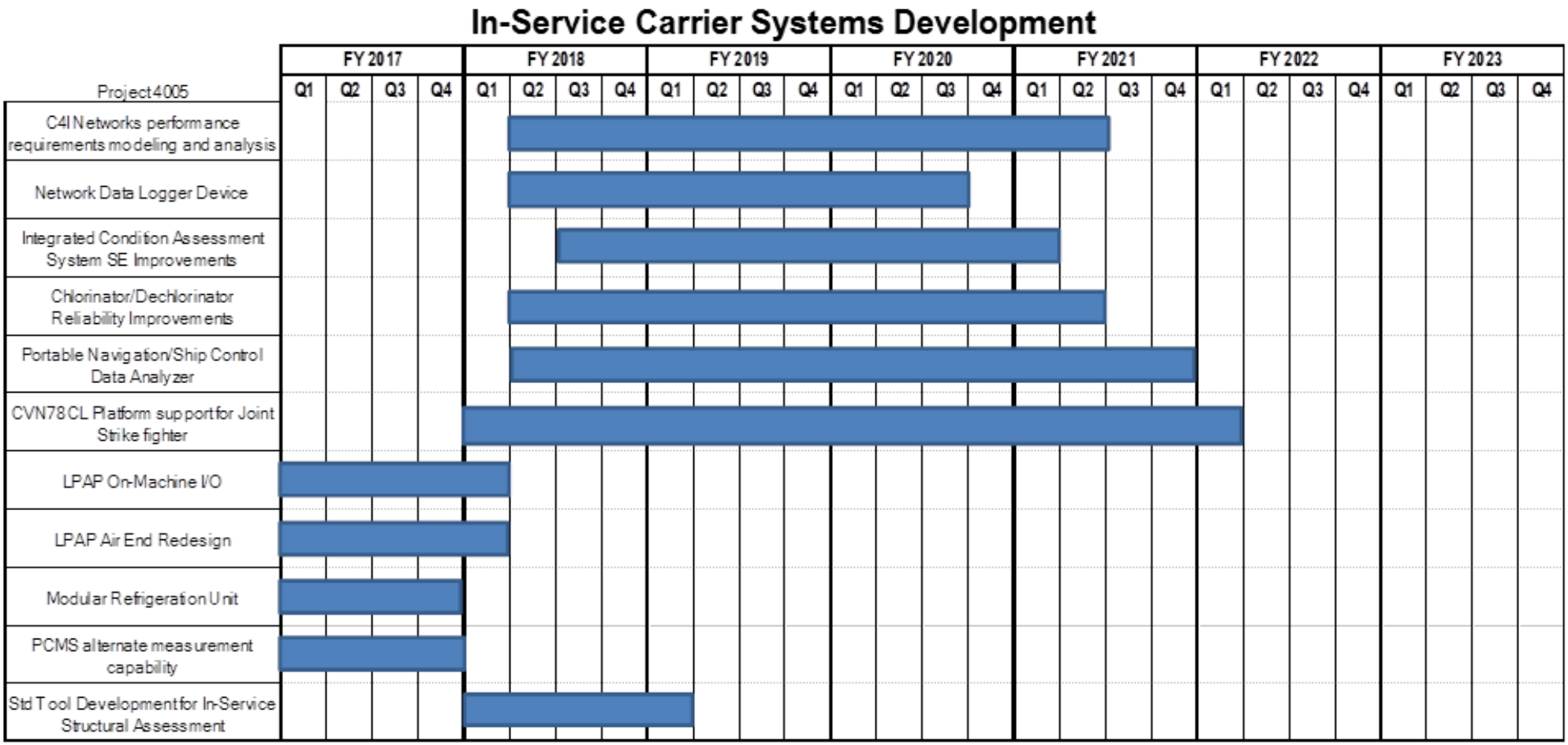
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DAWF | Various | Various : Various | 0.008 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.008 | - |
| | | **Subtotal** | 0.008 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.008 | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 24.795 | 0.573 | | 1.660 | | 1.192 | | - | | 1.192 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603512N / *Carrier Systems Development* | **Project (Number/Name)**<br>4005 / *In-Service Carrier Systems Development* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603512N / *Carrier Systems Development* | **Project (Number/Name)**<br>4005 / *In-Service Carrier Systems Development* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 4005*** | | | | |
| C4I Networks performance requirements modeling and analysis: C4I Networks performance requirements modeling and analysis | 2 | 2018 | 2 | 2021 |
| Network Data Logger Device: Network Data Logger Device | 2 | 2018 | 3 | 2020 |
| Integrated Condition Assessment System SE Improvements: Integrated Condition Assessment System SE Improvements | 3 | 2018 | 1 | 2021 |
| Chlorinator/Dechlorinator Reliability Improvements: Chlorinator/Dechlorinator Reliability Improvements | 2 | 2018 | 2 | 2021 |
| Portable Navigation/Ship Control Data Analyzer: Portable Navigation/Ship Control Data Analyzer | 2 | 2018 | 4 | 2021 |
| CVN78 CL Platform support for Joint Strike Fighter: CVN78 CL Platform support for Joint Strike fighter | 1 | 2018 | 1 | 2022 |
| LPAP On-Machine I/O: LPAP On-Machine I/O | 1 | 2017 | 1 | 2018 |
| LPAP Air End Redesign: LPAP Air End Redesign | 1 | 2017 | 1 | 2018 |
| Modular Refrigeration Unit: Modular Refrigeration Unit | 1 | 2017 | 4 | 2017 |
| PCMS alternate measurement capability: PCMS alternate measurement capability | 1 | 2017 | 4 | 2017 |
| Std Tool Development for In-Service Structural Assessment: Std Tool Development for In-Service Structural Assessment and risk definition | 2 | 2018 | 4 | 2019 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603525N *I (U)PILOT FISH* |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Program Element | 0.000 | 137.435 | 132.083 | 162.222 | - | 162.222 | 190.238 | 186.140 | 161.780 | 188.933 | Continuing | Continuing |
| 0428: *Pilot Fish* | 0.000 | 137.435 | 132.083 | 162.222 | - | 162.222 | 190.238 | 186.140 | 161.780 | 188.933 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

This program is reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 132.068 | 132.083 | 125.290 | - | 125.290 |
| Current President's Budget | 137.435 | 132.083 | 162.222 | - | 162.222 |
| Total Adjustments | 5.367 | 0.000 | 36.932 | - | 36.932 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | 9.999 | 0.000 | | | |
| • SBIR/STTR Transfer | -4.512 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | 16.100 | - | 16.100 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | 20.832 | - | 20.832 |
| • Congressional General Reductions Adjustments | -0.120 | - | - | - | - |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603527N *I (U)RETRACT LARCH* |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Program Element | 0.000 | 48.583 | 37.407 | 11.745 | 18.000 | 29.745 | 12.070 | 12.792 | 12.652 | 12.163 | Continuing | Continuing |
| 2690: *Retract Larch* | 0.000 | 48.583 | 37.407 | 11.745 | 18.000 | 29.745 | 12.070 | 12.792 | 12.652 | 12.163 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

This program is reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 14.546 | 15.407 | 8.135 | - | 8.135 |
| Current President's Budget | 48.583 | 37.407 | 11.745 | 18.000 | 29.745 |
| Total Adjustments | 34.037 | 22.000 | 3.610 | 18.000 | 21.610 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -1.855 | 0.000 | | | |
| • Program Adjustments | 35.907 | 22.000 | 3.975 | - | 3.975 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -0.365 | 18.000 | 17.635 |
| • Congressional General Reductions Adjustments | -0.015 | - | - | - | - |

**Change Summary Explanation**

Technical: Not applicable.
Schedule: Not applicable.

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603536N *I (U)RETRACT JUNIPER* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 0.000 | 107.871 | 122.413 | 114.265 | - | 114.265 | 99.781 | 102.023 | 100.758 | 106.544 | Continuing | Continuing |
| 4016: *Retract Sycamore* | 0.000 | 107.871 | 122.413 | 114.265 | - | 114.265 | 99.781 | 102.023 | 100.758 | 106.544 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

This program is reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 115.435 | 122.413 | 118.730 | - | 118.730 |
| Current President's Budget | 107.871 | 122.413 | 114.265 | - | 114.265 |
| Total Adjustments | -7.564 | 0.000 | -4.465 | - | -4.465 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | -4.550 | 0.000 | | | |
| • SBIR/STTR Transfer | -2.939 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | -0.915 | - | -0.915 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -3.550 | - | -3.550 |
| • Congressional General Reductions Adjustments | -0.075 | - | - | - | - |

**Change Summary Explanation**

Technical: Not applicable.
Schedule: Not applicable.

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603542N *I Radiological Control* |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Program Element | 4.441 | 0.677 | 0.745 | 0.740 | - | 0.740 | 0.746 | 0.760 | 0.776 | 0.794 | Continuing | Continuing |
| 1830: *RADIAC Development* | 4.441 | 0.677 | 0.745 | 0.740 | - | 0.740 | 0.746 | 0.760 | 0.776 | 0.794 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

Mission Description: The Radiation Detection, Indication and Computation (RADIAC) Program is responsible for providing radiation monitoring instruments that detect and measure ionizing radiation. These instruments are used on all Navy, Coast Guard and Military Sealift Command vessels, and at every Navy shore installation, in order to ensure the safety of personnel, continuity of operations in radiological contingencies, and protection of the environment.

Justification: Title 10 of the Code of Federal Regulations, Part 20 (10 CFR 20) requires RADIAC instruments be used to ensure the safety of personnel who work with or are exposed to radioactive materials in their jobs. Additionally, the Navy's mission requires personnel and ships to have the ability to operate in radiological environments and the ability to identify and interdict radiological Weapons of Mass Destruction (WMD). Navy programs that require RADIAC instruments for Occupational Safety & Health (OSH) reasons under the provisions of 10 CFR 20 include Naval Nuclear Propulsion, Nuclear Weapons, Medical, and Radiological Affairs Support. Non-OSH programs include Radiological Defense, Consequence Management, Training, Technical (RADIAC calibration, shielding evaluation, research, etc.) and Radiological Search (maritime interdiction and radiological search missions to locate or intercept WMD).

This budget item develops, tests and evaluates new, highly reliable, more easily calibrated, easy to care and maintain, light weight and modern RADIAC instruments in order to improve the effectiveness of radiation safety, to make instruments simpler to use, and to reduce life cycle costs. The ultimate goal is to replace old, bulky, costly to maintain and repair, unreliable and obsolete instrumentation with multifunction equipment that can be automatically calibrated at greatly reduced cost.

This budget item also provides for improvement to nuclear weapons intrinsic radiation (gamma and neutron) shielding calculations, mixed field (neutron and gamma) dosimetry, and in neutron measurement. The objective is to develop less costly and more effective integral shielding for better personnel protection and safety. Improvement in personnel dosimetry and neutron measurement is also a major emphasis.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603542N *I Radiological Control* |

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 0.702 | 0.745 | 0.762 | - | 0.762 |
| Current President's Budget | 0.677 | 0.745 | 0.740 | - | 0.740 |
| Total Adjustments | -0.025 | 0.000 | -0.022 | - | -0.022 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -0.025 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | -0.002 | - | -0.002 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -0.020 | - | -0.020 |

**Change Summary Explanation**

The FY 2019 funding request was reduced by $0.002 million to reflect the Department of Navy's effort to support the Office of Management and Budget directed reforms for Efficiency and Effectiveness that include a lean, accountable, more efficient government.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603542N / *Radiological Control* | Project (Number/Name)<br>1830 / *RADIAC Development* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1830: *RADIAC Development* | 4.441 | 0.677 | 0.745 | 0.740 | - | 0.740 | 0.746 | 0.760 | 0.776 | 0.794 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Mission: The Radiation Detection, Indication and Computation (RADIAC) Program is responsible for providing radiation monitoring instruments that detect and measure radiation in accordance with the provisions of Title 10 of the Code of Federal Regulations (10 CFR). These instruments are used on all vessels afloat and at every shore installation in order to ensure the safety of personnel and the environment. RADIACs are also required after an act of terrorism or war that involves nuclear material in order to enable continuing warfighting ability.

Justification: Many RADIAC instruments and dosimetry systems are decades old and approaching the end of their useful lives. In some cases the equipment and replacement parts are no longer manufactured, making the equipment logistically unsupportable. In other cases increasing failure rates due to age make replacements an economic efficiency
improvement. In all cases a technology refresh will make both economic sense in terms of lowering the total ownership costs, and will also provide increased operational capabilities.

Naval Nuclear Propulsion Program (NNPP): Instruments are developed to support the safe operation and maintenance of nuclear powered vessels and at nuclear maintenance facilities.

Non-NNPP: Instruments are developed to support other than NNPP end users, such as Explosive Ordnance Disposal, Nuclear Weapons, Medical, Industrial Radiography, Radiological Defense and Training.

Visit, Board, Search & Seizure (VBSS): The Navy has been tasked to intercept and board vessels at sea to search for nuclear or radiological materials that could be used for terrorist attacks. These instruments would have different characteristics than those used for NNPP and non-NNPP purposes and prototypes must be developed and/or tested and evaluated.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Radiological Shipboard Defense Monitor | 0.080 | 0.000 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** All surface combatants require an instrument to detect and measure radiological activity in the event of a nuclear detonation in order for the ship to avoid the radiological danger and continue its mission. The AN/PDR-65, at over 40 years of age, was the instrument used for this purpose, but it is obsolete and has been de-fielded. An interim replacement has been fielded while OPNAV finalizes updating the Cold War requirements | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603542N / *Radiological Control* | **Project (Number/Name)**<br>1830 / *RADIAC Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| under which the AN/PDR-65 was designed in order to include radiological (terrorist "dirty bomb") threats. The interim replacement is the IM-265 Survey Meter, which is already in the Navy inventory, but was not designed for this requirement and cannot measure radiation external to the ship and is therefore not suitable as the permanent replacement.<br><br>***FY 2018 Plans:***<br>N/A<br><br>***FY 2019 Base Plans:***<br>N/A<br><br>***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***Title:*** Primary Dosimetry<br>***Articles:*** | 0.280<br>1 | 0.172<br>1 | 0.179<br>- | 0.000<br>- | 0.179<br>- |
| ***Description:*** The need for primary dosimetry is inherent due to the Navy's operation of nuclear reactors and their emission of ionizing radiation. Title 10 of the Code of Federal Regulations, Part 20.1502, states "Each licensee shall monitor exposures to radiation and radioactive material at levels sufficient to demonstrate compliance with the occupational dose limits." A primary dosimeter must pass accreditation proficiency testing, allowing the reading obtained to become a part of an individual's permanent health record. This permanent record is used to protect the individual radiation worker's health, and also the Navy from future liability. The Navy's current primary device is the DT-702/PD, a Thermo Luminescence Dosimeter (TLD). Existing TLD and newer technologies, such as Optically Stimulated Luminescence (OSL), must be continually researched to determine on-going performance parameters, cost to field and cost to maintain.<br><br>***FY 2018 Plans:***<br>NSWCCD and NDC will complete reporting on the pilot study with BeO dosimetry. Additionally, NSWCCD will perform environmental testing, guided by the ANSI N13.11 requirements for normal environmental conditions, on both OSL systems. When all tests are complete, NSWCCD and NDC will submit a comprehensive Technical Report on both OSL systems to SEA 04ND. NSWCCD will also remain up to date on advances of the BeO system and submit a contract package for the FY18 procurement of BeO neutron dosimeters. Finally, NSWCCD will utilize the Freiberg Lexsyg reserach imaging TL-OSL-RF system to characterize existing and future primary | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603542N / *Radiological Control* | **Project (Number/Name)**<br>1830 / *RADIAC Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| dosimeters' luminescent properties to ensure quality and check material weakness prior to adopting these systems into the US Navy. Findings will be summarized in a Technical Memorandum to SEA 04ND.<br>***FY 2019 Base Plans:***<br>NSWCCD will submit a test plan to Naval Sea Systems Command (NAVSEA 04ND) and perform American National Standards Institute (ANSI) N13.11 standard proficiency testing, including neutron radiation tests, on the neutron-capable Beryllium Oxide (BeO) Optically-Stimulated Luminescence (OSL) dosimeters acquired in FY18. NSWCCD will submit the results from the radiological testing to NAVSEA 04ND in a Technical Memorandum. NSWCCD will also continue market research for test and evaluation of new or improved technology applicable to primary dosimetry.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No significant change. | | | | | |
| ***Title:*** Secondary Dosimetry | 0.167 | 0.125 | 0.145 | 0.000 | 0.145 |
| ***Articles:*** | 3 | - | - | - | - |
| ***Description:*** A secondary dosimeter provides an accurate, real-time readout of the radiation exposure being obtained in operational environments, and is utilized in conjunction with a primary dosimeter. The primary dosimeter does not provide real-time exposure information, so the secondary dosimeter is worn for that purpose. The Navy's secondary dosimeter is the Mk2 Electronic Personal Dosimeter (EPD). Research is required to find a secondary dosimeter that can measure the type of radiation encountered with pulsed X-ray machines, and to see if this new capability can be incorporated into one device.<br>***FY 2018 Plans:***<br>NSWCCD will continue analyzing Navy user feedback and desired specifications on current pulsed X-ray and electronic dosimetry. Additional market research and testing will be performed as appropriate. NSWCCD will continue analyzing Navy requirements and desired specifications for extremity/lens dosimetry. Testing for the FY17 purchase of extremity dosimetry and criticality dosimetry units will be performed. NSWCCD will submit a Test Plan to SEA 04ND for approval. Additional market research and testing may be performed as appropriate. NSWCCD will submit a Technical Memorandum to SEA 04ND updating commercial capabilities and evaluations with respect to Navy requirements.<br>***FY 2019 Base Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603542N / *Radiological Control* | **Project (Number/Name)**<br>1830 / *RADIAC Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| NSWCCD will continue to remain abreast of the latest advances in electronic dosimetry, both from radiological and logistical perspectives. NSWCCD will assist the SEA 04ND In Service Engineering Agent in the analysis of the logistics necessary to support a new electronic dosimetry system, considering that the Navy's current instrument will go out of production in FY22, necessitating the beginning of a search for a replacement with the possibility it will include enhanced capabilities. NSWCCD will complete investigation into the logistics infrastructure capabilities of new systems and provide an assessment in a Technical Memorandum to Naval Sea Systems Command (NAVSEA 04ND) detailing the areas of improvement possible for the Navy's system.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Inflation and additional test and evaluation man hours. | | | | | |
| ***Title:*** Radiological Detection System | 0.110 | 0.150 | 0.161 | 0.000 | 0.161 |
| ***Articles:*** | - | - | 3 | - | 3 |
| ***Description:*** The Radiological Detection System (RDS) is a survey meter and its associated probes (alpha, beta, gamma, and neutron) used in a wide variety of applications, and the necessary ancillary equipment such as cases, cables and technical manuals. This type of survey meter system is the single most prevalent RADIAC instrument in the Navy inventory, utilized for every Navy end use but predominantly in the Naval Nuclear Propulsion Program (NNPP) and Radiological Defense (RD) end uses. The Joint Program Executive Office for Chemical, Biological and Nuclear Defense (JPEO-CBND) is currently developing the RDS for use by all the Services. When all the Services agree on a single system, it will lower the procurement cost for all and just as significantly, for the first time enable Joint interoperability in the warfighter's Radiological Defense arena. The Navy's current version of this instrument is the IM-260/PD, which is 30 years old and nearing the end of its useful life. Army and Marine Corps use the AN/PDR-75 system and the Air Force the ADM-300, which are both also decades old and obsolescent.<br><br>The NNPP end use is unique amongst the Services, and while the RDS solution should prove to be sufficient for all the Services for most of their respective applications, Navy must test and evaluate the proposed RDS to ensure the performance and specifications of a Joint solution will be sufficient to meet the requirements of the NNPP application.<br>***FY 2018 Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603542N / *Radiological Control* | **Project (Number/Name)**<br>1830 / *RADIAC Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| NSWCCD will continue coordinating with JPEO-CBND in RDS related activities.<br>***FY 2019 Base Plans:***<br>NSWCCD will purchase three low rate initial production units through JPEO-CBND. The units will undergo radiological testing at NSWCCD to ensure they meet Navy specifications for all applications. Product demonstrations will be provided to Naval Sea Systems Command (NAVSEA 04ND), Office of the Chief of Naval Operations (OPNAV) N45 and N96, and major end users. A summary of test results and end user feedback will be provided in a Technical Memorandum to NAVSEA 04ND and JPEO-CBND to assist in the procurement stage of the RDS project.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Procurement of three test articles. | | | | | |
| ***Title:*** Visit, Board, Search & Seizure | 0.040 | 0.043 | 0.076 | 0.000 | 0.076 |
| ***Articles:*** | - | 6 | 3 | - | 3 |
| ***Description:*** The Visit, Board, Search & Seizure (VBSS) mission of the Navy includes the requirement to be able to board ships and be able to detect and identify potential radiological or nuclear Weapons of Mass Destruction (WMD). Such a sensitive mission requires leading edge technology and capabilities to ensure success. The AN/PDX-1 RADIAC Set was fielded in response to a Joint Urgent Operational Needs Statement to meet this requirement. It contains three instruments that serve different purposes: (1) a Handheld Radiation Monitor (HRM)that searches for radiological materials; (2) a Radioisotope Identifier (RID) that identifies the type of radiological material located; and (3) a Personal Radiation Detector (PRD) that displays the radiological dose the VBSS team members may be receiving so that they can be aware if they are being exposed to dangerous levels of radioactivity during the mission. Current technology dictates that the sensitivity of the detectors is directly proportional to the size of the detector element; i.e., the larger the detector, the more sensitive and capable it is. However, in VBSS there must be a tradeoff between size/weight and capability, since it is difficult and hazardous for boarding parties to carry a backpack-sized detector, along with their weapons and other gear, up a rope ladder to board a vessel on the high seas. This will be a continuing effort to find smaller, lighter instruments with enhanced sensitivity, reach-back capability, and other enhancements to provide the Navy the best and most cost effective equipment possible for this critical mission.<br>***FY 2018 Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603542N / *Radiological Control* | **Project (Number/Name)**<br>1830 / *RADIAC Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| NSWCCD will purchase new PRDs and HRMs for test and evaluation. The Test Plan developed in FY17 will be finalized and submitted to SEA 04ND, so that evaluation of new units can begin upon delivery. NSWCCD will complete test and evaluation of the commercial units, summarize the results and submit the findings in a Technical Report to SEA 04ND. Simultaneously, NSWCCD will internally review all VBSS RID Technical Report data to date, so as to analyze development of the technology over time. Recurring issues and other trends will be noted in order to create a more detailed plan for the next round of test and evaluation. Additional test data from other sources, such as the Defense Threat Reduction Agency (DTRA), will be researched to aid in developing the next Test Plan. NSWCCD will also perform market research into new commercial RID products and capabilities by surveying industry and other technical contacts. NSWCCD will then develop a specification for the next purchase of RIDs and prepare a procurement package for FY19 solicitation.<br>***FY 2019 Base Plans:***<br>NSWCCD will solicit and award contracts to buy three new commercial Radioisotope Identifiers (RIDs). The test plan developed in FY18 will be finalized and submitted to Naval Sea Systems Command (NAVSEA 04ND) for approval in order that evaluation of the new RIDs can begin upon delivery. NSWCCD will complete test and evaluation of the RIDs, summarize the results and submit the findings in a Technical Report to NAVSEA 04ND.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Procurement of three test articles. | | | | | |
| ***Title:*** Telescoping Rate Meter | 0.000 | 0.255 | 0.179 | 0.000 | 0.179 |
| ***Articles:*** | - | 5 | - | - | - |
| ***Description:*** Telescoping rate meters play a vital role in the practice of radiation safety in the Naval Nuclear Propulsion Program. The detector is attached to the end of an extendable, telescoping pole, thus allowing the operator to maintain a safe distance from high exposure areas. This allows the Navy to comply with federal regulations, which mandate that radioactive doses received by operators be As Low As Reasonably Achievable (ALARA). The current instrument is 30 years old and approaching obsolescence due to the unavailability of repair parts.<br>***FY 2018 Plans:***<br>NSWCCD will perform market research into commercial versions of this instrument as used in commercial nuclear power applications. Published specifications wil be compared against the performance of the Navy's | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603542N / *Radiological Control* | **Project (Number/Name)**<br>1830 / *RADIAC Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| current IM-260. End-user feedback regarding desired performance will be collected. NSWCCD will prepare and submit a contract package for the procurement of several telescoping rate meter units for evaluation.<br>***FY 2019 Base Plans:***<br>NSWCCD will submit a test plan to Naval Sea Systems Command (NAVSEA 04ND) and upon its approval complete testing on the telescoping rate meter units that were procured in FY18. The test results and their applicability to US Navy requirements will be summarized in a Technical Memorandum to NAVSEA 04ND.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Test articles procured in FY18 but not in FY19. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.677 | 0.745 | 0.740 | 0.000 | 0.740 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • OPN 2920: *RADIAC* | 8.092 | 10.718 | 8.175 | - | 8.175 | 8.269 | 8.344 | 8.524 | 8.693 | Continuing | Continuing |

**Remarks**

**D. Acquisition Strategy**

Development efforts are focused on evaluation, modification (as required to meet operational requirements) and adaptation of commercial-off-the-shelf (COTS) technology in order to minimize total ownership costs. To the maximum extent possible new contracts are targeted for fixed price efforts to control development cost.

**E. Performance Metrics**

Program Reviews

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603542N / *Radiological Control* | Project (Number/Name)<br>1830 / *RADIAC Development* | |

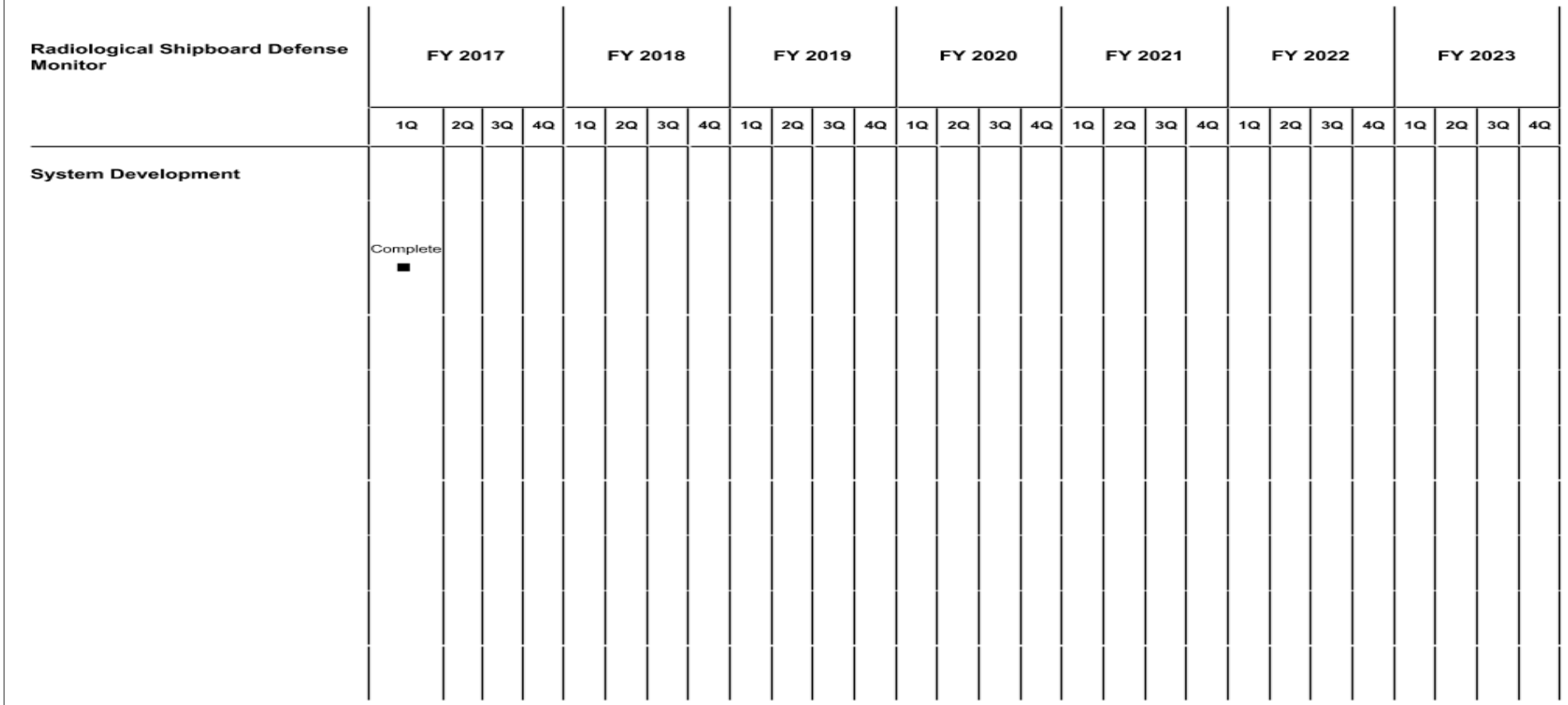
**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Test & Evaluation | WR | NSWCCD : West Bethesda, MD | 4.201 | 0.350 | Nov 2016 | 0.639 | Nov 2017 | 0.614 | Nov 2018 | - | | 0.614 | Continuing | Continuing | Continuing |
| Primary Dosimetry | C/FFP | NSWCCD : West Bethesda, MD | 0.100 | 0.185 | Aug 2017 | 0.003 | May 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.288 | 0.288 |
| Secondary Dosimetry | C/FFP | NSWCCD : West Bethesda, MD | 0.020 | 0.142 | Aug 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.162 | 0.162 |
| VBSS | C/FFP | NSWCCD : West Bethesda, MD | 0.120 | 0.000 | | 0.063 | Jun 2018 | 0.063 | Jun 2019 | - | | 0.063 | 0.000 | 0.246 | 0.246 |
| Telescoping Rate Meter | C/FFP | NSWCCD : West Bethesda, MD | 0.000 | 0.000 | | 0.040 | Jul 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.040 | 0.040 |
| Radiological Detection System | C/FFP | NSWCCD : West Bethesda, MD | 0.000 | 0.000 | | 0.000 | | 0.063 | Sep 2019 | - | | 0.063 | 0.000 | 0.063 | 0.063 |
| | | **Subtotal** | 4.441 | 0.677 | | 0.745 | | 0.740 | | - | | 0.740 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 4.441 | 0.677 | | 0.745 | | 0.740 | | - | | 0.740 | Continuing | Continuing | N/A |

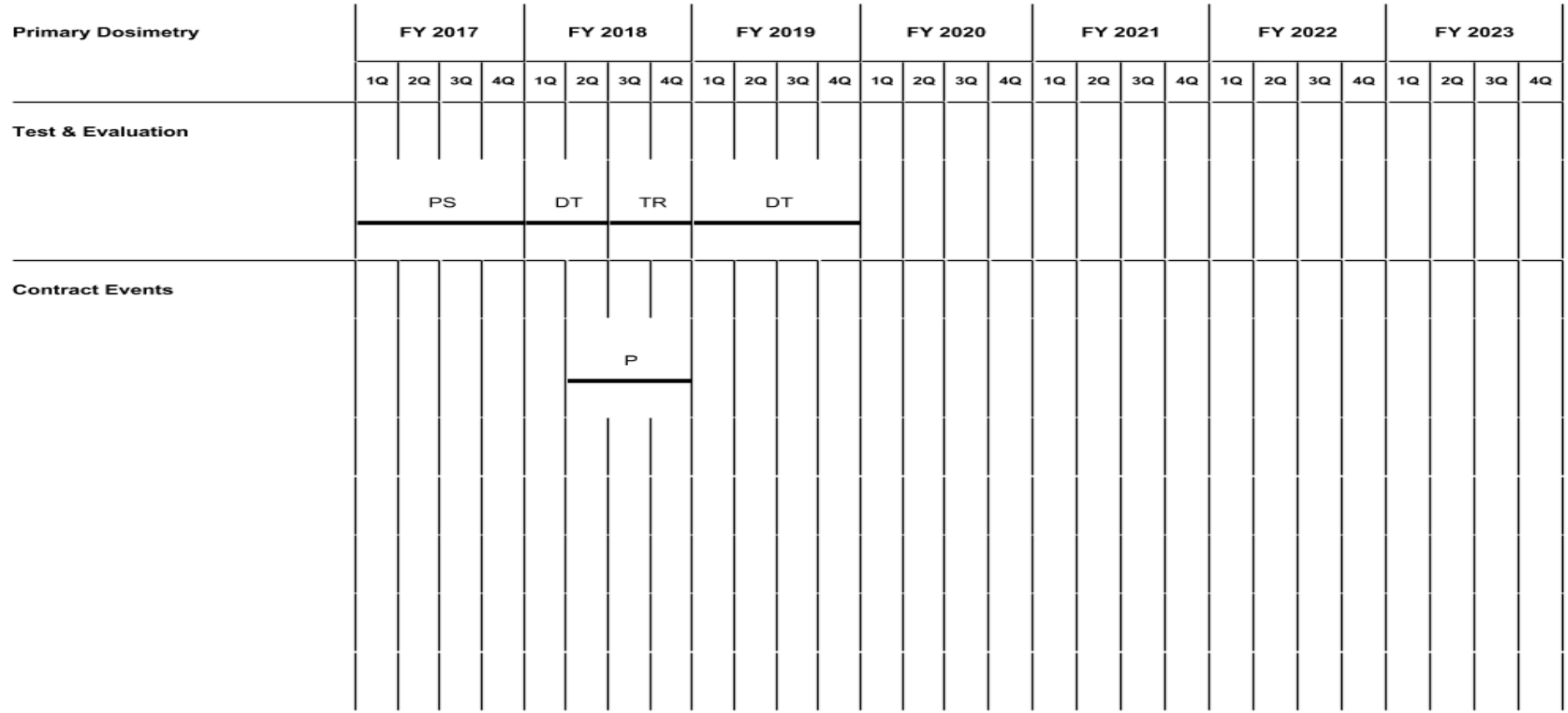
**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603542N / *Radiological Control* | **Project (Number/Name)**<br>1830 / *RADIAC Development* |



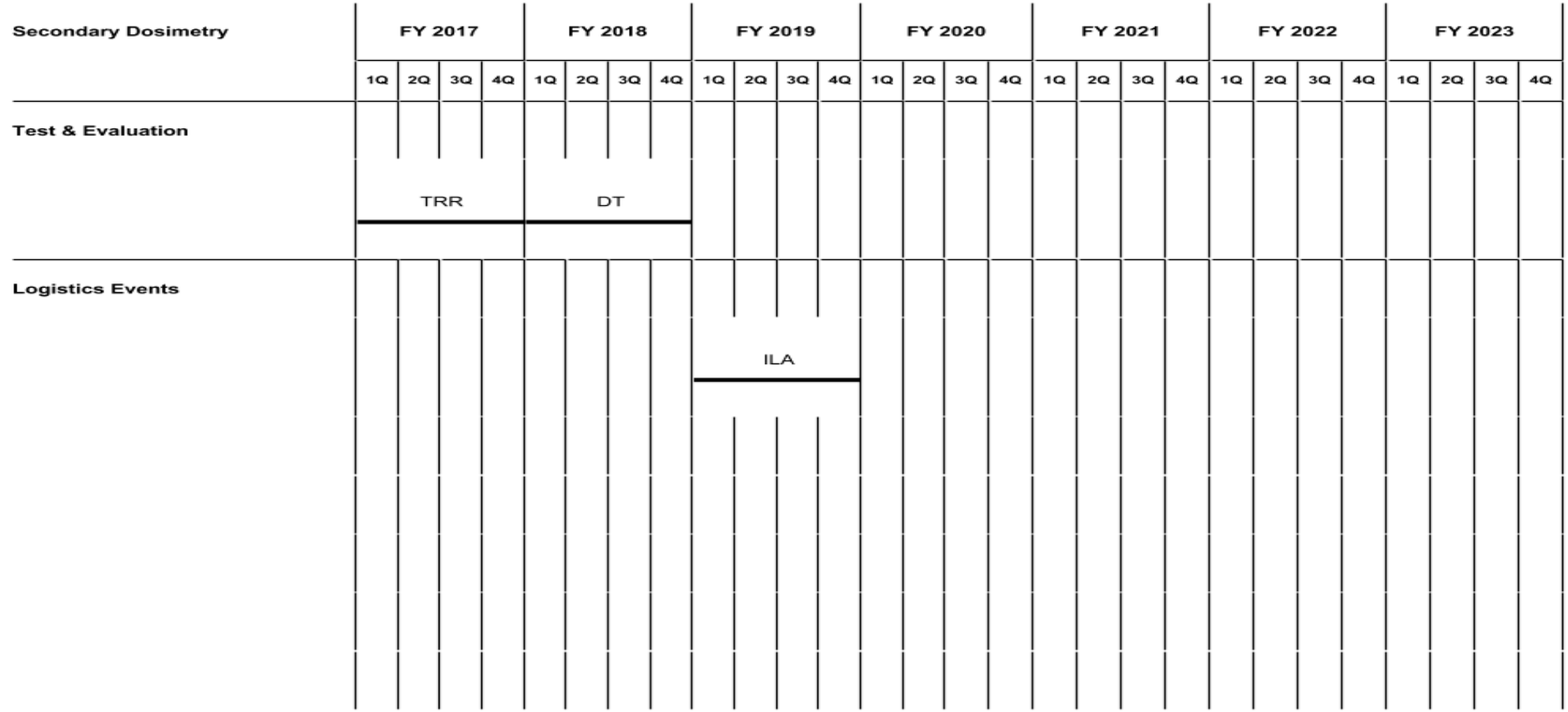

*2019PB - 0603542N - 1830*

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603542N / *Radiological Control* | **Project (Number/Name)**<br>1830 / *RADIAC Development* |



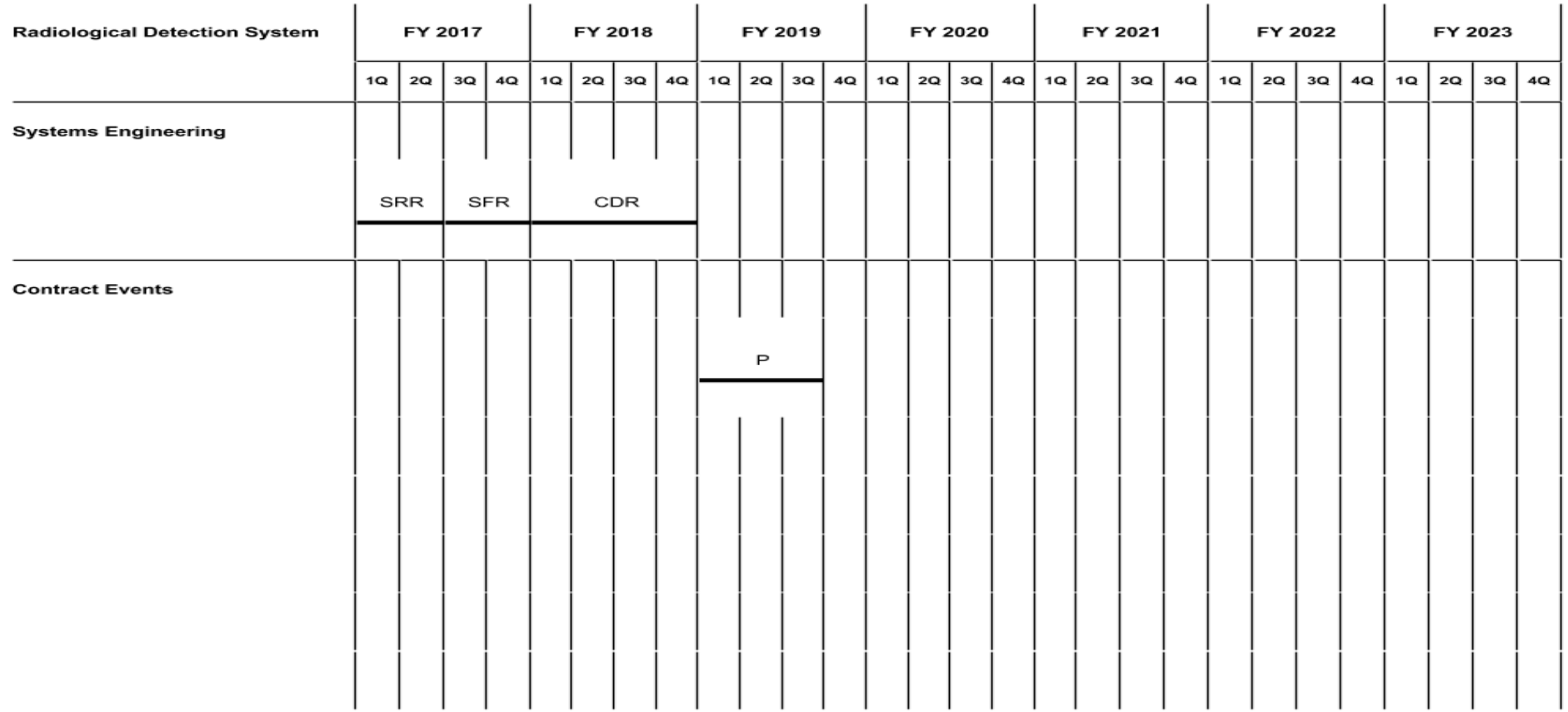

*2019PB - 0603542N - 1830*

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603542N / *Radiological Control* | **Project (Number/Name)**<br>1830 / *RADIAC Development* |



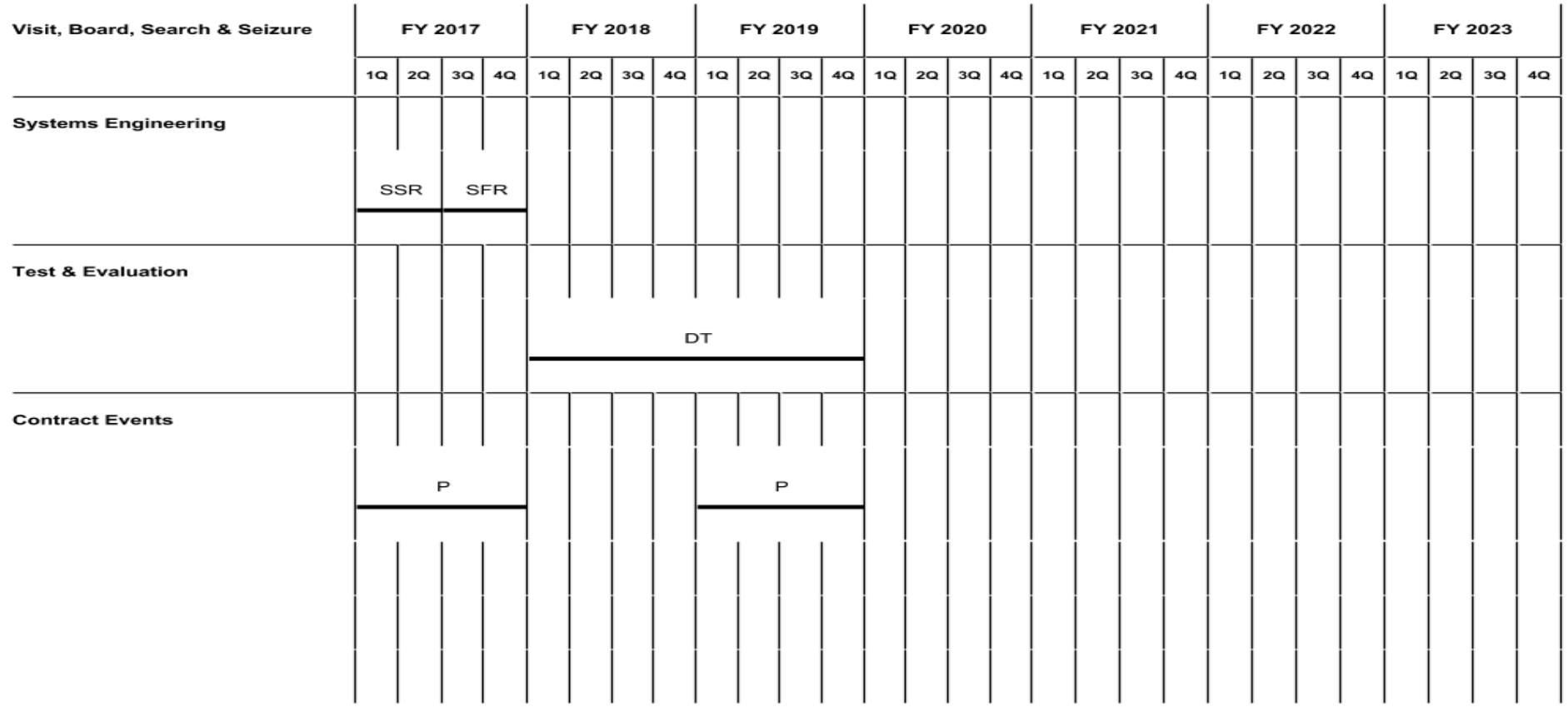

*2019PB - 0603542N - 1830*

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603542N / *Radiological Control* | **Project (Number/Name)**<br>1830 / *RADIAC Development* |



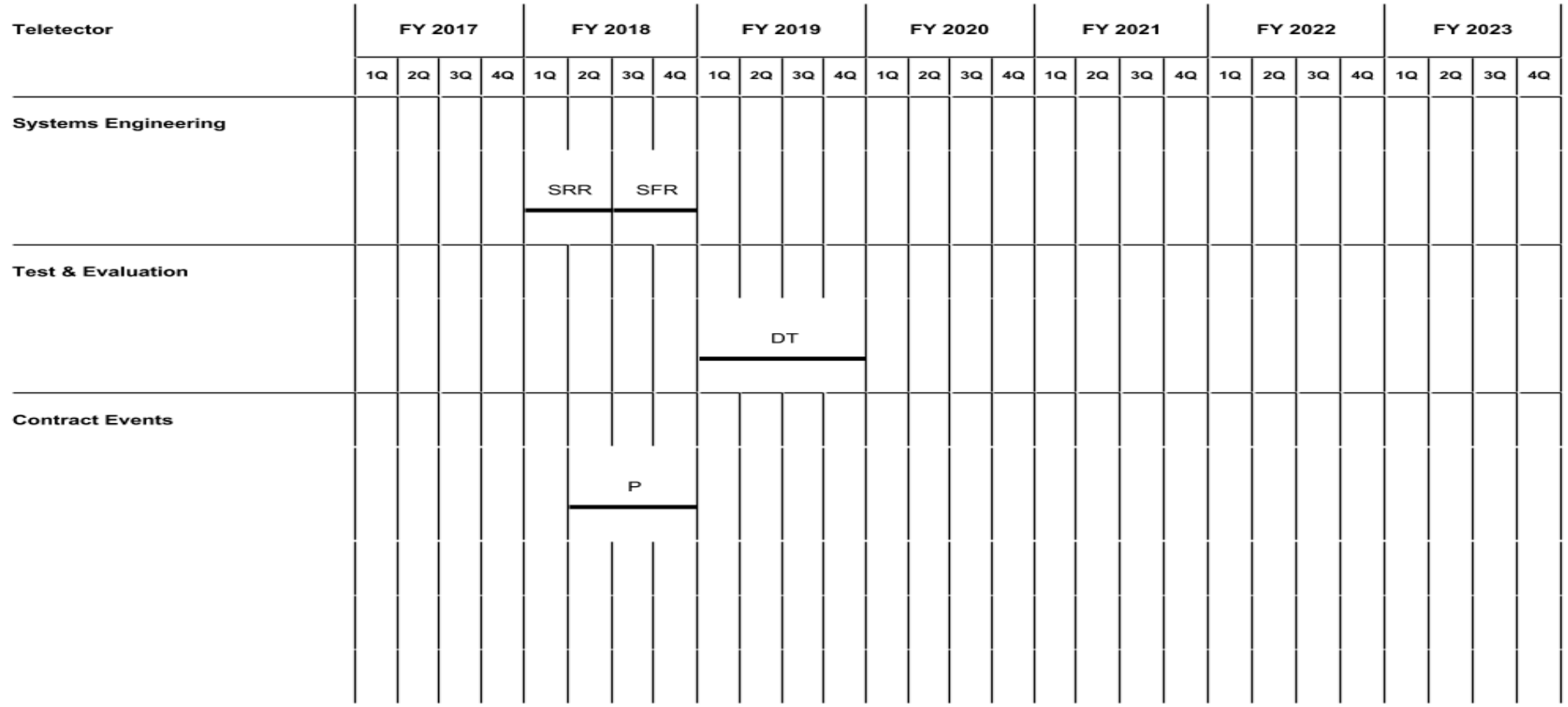

*2019PB - 0603542N - 1830*

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603542N / *Radiological Control* | **Project (Number/Name)**<br>1830 / *RADIAC Development* |




*2019PB - 0603542N - 1830*

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603542N / *Radiological Control* | **Project (Number/Name)**<br>1830 / *RADIAC Development* |




*2019PB - 0603542N - 1830*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603542N / *Radiological Control* | **Project (Number/Name)**<br>1830 / *RADIAC Development* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Radiological Shipboard Defense Monitor*** | | | | |
| System Development: Complete | 1 | 2017 | 1 | 2017 |
| ***Primary Dosimetry*** | | | | |
| Test & Evaluation: Pilot Study of Beryllium Oxide (BeO) Dosimetry | 1 | 2017 | 4 | 2017 |
| Test & Evaluation: Environmental Testing of BeO Dosimetry | 1 | 2018 | 2 | 2018 |
| Test & Evaluation: Technical Report on Optically Stimulated Luminescence Dosimetery | 3 | 2018 | 4 | 2018 |
| Test & Evaluation: Proficiency Testing of Neutorn Capable Dosimeters | 1 | 2019 | 4 | 2019 |
| Contract Events: Procure Neutron Capable Dosimeters | 2 | 2018 | 4 | 2018 |
| ***Secondary Dosimetry*** | | | | |
| Test & Evaluation: Test Readiness Review and Data Compilation | 1 | 2017 | 4 | 2017 |
| Test & Evaluation: Pulsed X-ray and Electronic Dosimetry | 1 | 2018 | 4 | 2018 |
| Logistics Events: Integrated Logistics Analysis | 1 | 2019 | 4 | 2019 |
| ***Radiological Detection System*** | | | | |
| Systems Engineering: System Requirements Review | 1 | 2017 | 2 | 2017 |
| Systems Engineering: System Functional Review | 3 | 2017 | 4 | 2017 |
| Systems Engineering: Critical Design Review | 1 | 2018 | 4 | 2018 |
| Contract Events: Procure LRIP Units | 1 | 2019 | 3 | 2019 |
| ***Visit, Board, Search & Seizure*** | | | | |
| Systems Engineering: System Requirements Review | 1 | 2017 | 2 | 2017 |
| Systems Engineering: System Functional Review | 3 | 2017 | 4 | 2017 |
| Test & Evaluation: Developmental Test & Evaluation | 1 | 2018 | 4 | 2019 |
| Contract Events: Procure PRD and HRM Test Units | 1 | 2017 | 4 | 2017 |
| Contract Events: Procure RID Test Units | 1 | 2019 | 4 | 2019 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603542N / *Radiological Control* | **Project (Number/Name)**<br>1830 / *RADIAC Development* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Teletector*** | | | | |
| Systems Engineering: System Requirements Review | 1 | 2018 | 2 | 2018 |
| Systems Engineering: System Functional Review | 3 | 2018 | 4 | 2018 |
| Test & Evaluation: Developmental Test & Evaluation | 1 | 2019 | 4 | 2019 |
| Contract Events: Procure Test Units | 2 | 2018 | 4 | 2018 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy* / BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603553N / *Surface ASW* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 185.861 | 1.039 | 1.136 | 1.122 | - | 1.122 | 1.145 | 1.170 | 1.195 | 1.220 | Continuing | Continuing |
| 1704: *Undersea Warfare* | 185.861 | 1.039 | 1.136 | 1.122 | - | 1.122 | 1.145 | 1.170 | 1.195 | 1.220 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

The FY 2019 funding request was reduced by $.006 million to reflect the Department of Navy's effort to support the Office of Management and Budget directed reforms for Efficiency and Effectiveness that include a lean, accountable, more efficient government.

The Rest-of-the-World (ROW) continues to produce quieter, more lethal submarine technologies. Adaptable commercial technologies are readily available to the ROW navies. These trends increase the threats to United States (US) surface combatants, thus requiring a focused effort to identify the most promising Anti-Submarine Warfare (ASW) technologies through a process of discovery, assessment, experimentation, and analysis.

This project will pursue the development of technologies with the goal of improving ASW effectiveness to the point of rendering the enemy submarine irrelevant against US and coalition forces. Studies, experiments and/or technology developments under this project will seek to improve the ability of surface combatants to detect, classify, localize, and track submerged contacts and detect and defend against modern torpedoes. To achieve these objectives, it is essential to develop new ASW technologies and conduct at-sea experiments to prove/disprove technology concepts and collect corroborating data. The product of these efforts will be provided to the Advanced Capability Build (ACB) program supporting the continuing improvement of the AN/SQQ-89 Surface ASW Combat System.

| **B. Program Change Summary ($ in Millions)** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** |
|---|---|---|---|---|---|
| Previous President's Budget | 1.081 | 1.136 | 1.159 | - | 1.159 |
| Current President's Budget | 1.039 | 1.136 | 1.122 | - | 1.122 |
| Total Adjustments | -0.042 | 0.000 | -0.037 | - | -0.037 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -0.042 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | -0.024 | - | -0.024 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -0.013 | - | -0.013 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603553N *I Surface ASW* |

**Change Summary Explanation**

Funding: The decrease in FY 2019 will result in less capabilities developed via the BAA process and transmitted to the ACB program and is attributable to inflation and contractor support services specific rate adjustments.

Schedule: Broad Agency Announcement (BAAs) awards in FY 2019, FY 2021, and FY 2023 have been shifted from 1Q to 2Q to more accurately reflect funding availability and time required to make a new award.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | | | | | R-1 Program Element (Number/Name)<br>PE 0603553N / *Surface ASW* | | | | Project (Number/Name)<br>1704 / *Undersea Warfare* | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| 1704: *Undersea Warfare* | 185.861 | 1.039 | 1.136 | 1.122 | - | 1.122 | 1.145 | 1.170 | 1.195 | 1.220 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The Rest-of-the-World (ROW) continues to produce quieter, more lethal submarine technologies. Adaptable commercial technologies are readily available to the ROW navies. These trends increase the threats to United States (US) surface combatants, thus requiring a focused effort to identify the most promising Anti-Submarine Warfare (ASW) technologies through a process of discovery, assessment, experimentation, and analysis.

This project will pursue the development of technologies with the goal of improving ASW effectiveness to the point of rendering the enemy submarine irrelevant against US and coalition forces. Studies, experiments and/or technology developments under this project will seek to improve the ability of surface combatants to detect, classify, localize, and track submerged contacts and detect and defend against modern torpedoes. To achieve these objectives, it is essential to develop new ASW technologies and conduct at-sea experiments to prove/disprove technology concepts and collect corroborating data. The product of these efforts will be provided to the Advanced Capability Build (ACB) program supporting the continuing improvement of the AN/SQQ-89 Surface ASW Combat System.

| **B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** |
|---|---|---|---|---|---|
| ***Title:*** ASW Concept Development/Studies | 1.039 | 1.136 | 1.122 | 0.000 | 1.122 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Collect systems and performance data during select Fleet exercises and at-sea testing events, including one additional data collection event on relevant modern torpedo acoustic signature characteristics. Analyze and distribute collected data. Conduct studies and AoA in support of improved ASW operations. Continue advanced development efforts initiated in FY17 to prototype promising new ASW concepts applying Doppler Matched Processing techniques to ASW and Torpedo Defense. | | | | | |
| ***FY 2019 Base Plans:***<br>Award new development contract via BAA in support of AN/SQQ-89 Fleet requirements. Initiate capability development and submit to the ACB program from Step 1 (algorithm/technology assessment by peer review panel of Subject Matter Experts (SME)) and Step 2 (algorithm/technology testing with open and closed data sets to refine capabilities prior to integration) testing. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603553N / *Surface ASW* | **Project (Number/Name)**<br>1704 / *Undersea Warfare* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| The decrease in FY 2019 due to rate adjustments. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 1.039 | 1.136 | 1.122 | 0.000 | 1.122 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • RDTEN/0205620N/1916: *Surface ASW System Improvement* | 23.779 | 29.351 | 28.421 | - | 28.421 | 29.766 | 29.476 | 30.000 | 30.629 | Continuing | Continuing |
| • OPN/2136: *AN/SQQ-89 Surf ASW Cmbt Sys* | 87.824 | 102.222 | 115.459 | - | 115.459 | 125.586 | 127.452 | 132.673 | 135.329 | Continuing | Continuing |

**Remarks**

**D. Acquisition Strategy**

Use competitively awarded contracts from Broad Agency Announcement (BAA) solicitations.

**E. Performance Metrics**

Investigate promising ASW technologies via the four step ACB spiral development/improvement process.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603553N / *Surface ASW* | Project (Number/Name)<br>1704 / *Undersea Warfare* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Technology Development | C/CPFF | AAC : NY | 1.134 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.134 | - |
| Technology Development | C/CPFF | Adaptive Methods : VA | 3.788 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.788 | - |
| Technology Development | C/CPFF | Alion Sciences : VA | 8.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 8.000 | - |
| Technology Development | C/CPAF | EG&G : VA | 2.050 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.050 | - |
| Technology Development | C/CPFF | In-Depth Engineering : VA | 3.635 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.635 | - |
| Technology Development | C/CPFF | JHU/APL : MD | 25.333 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 25.333 | - |
| Technology Development | C/CPFF | L-3 Communications : VA | 3.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.000 | - |
| Technology Development | C/CPFF | Lockheed Martin - ISS : NY | 7.110 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 7.110 | - |
| Technology Development | WR | NSWC/Carderock : MD | 3.201 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.201 | - |
| Technology Development | WR | NUWC/Keyport : WA | 0.790 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.790 | - |
| Technology Development | WR | NUWC/Newport : RI | 33.260 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 33.260 | - |
| Technology Development | C/CPFF | Northrop Grumman : VA | 4.684 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 4.684 | - |
| Technology Development | C/CPFF | UT/ARL : TX | 4.908 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 4.908 | - |
| Technology Development | C/CPFF | VAR : VAR* | 4.694 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 4.694 | - |
| Technology Development | WR | NFESC/PH : CA | 5.350 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 5.350 | - |
| Technology Development | MIPR | SSGC : MS | 3.253 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.253 | - |
| Detection/Classification Algorithms (LRS) | WR | NAWC/Pax River : MD | 2.400 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.400 | - |
| Detection/Classification Algorithms (LRS) | C/CPFF | VAR : VAR* | 8.600 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 8.600 | - |
| Technology Development (LRS) | WR | NRL : DC | 2.500 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.500 | - |
| Technology Development (LRS) | C/CPFF | VAR : VAR* | 14.950 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 14.950 | - |
| | | **Subtotal** | 142.640 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 142.640 | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603553N / *Surface ASW* | Project (Number/Name)<br>1704 / *Undersea Warfare* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

**Remarks**

*Consists of multiple performing activities with funding for each not greater than $1M per year.

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| At-Sea Test/Experiment | WR | ONR : VA | 5.500 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 5.500 | - |
| Developmental Test & Evaluation | C/CPFF | AAC : NY | 1.067 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.067 | - |
| Developmental Test & Evaluation | C/CPFF | ALION : IL | 0.749 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.749 | - |
| Developmental Test & Evaluation | C/CPFF | Applied Physical Sciences : CT | 0.000 | 0.749 | Feb 2017 | 0.750 | Jan 2018 | 0.731 | Dec 2018 | - | | 0.731 | Continuing | Continuing | Continuing |
| Developmental Test & Evaluation | C/CPFF | JHU/APL : MD | 2.735 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.735 | - |
| Developmental Test & Evaluation | WR | NRL : DC | 0.537 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.537 | - |
| Developmental Test & Evaluation | WR | NSMA : VA | 0.907 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.907 | - |
| Developmental Test & Evaluation | WR | NSWC/Carderock : MD | 1.172 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.172 | - |
| Developmental Test & Evaluation | WR | NUWC/Newport : RI | 11.453 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 11.453 | - |
| Developmental Test & Evaluation | WR | SPAWAR : CA | 0.277 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.277 | - |
| Developmental Test & Evaluation | C/CPFF | UT/ARL : TX | 1.844 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.844 | - |
| Developmental Test & Evaluation | C/CPFF | VAR : VAR* | 5.224 | 0.170 | Jan 2017 | 0.266 | Feb 2018 | 0.289 | Dec 2018 | - | | 0.289 | Continuing | Continuing | Continuing |
| Enhanced Data Collection | C/CPFF | JHU/APL : MD | 4.462 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 4.462 | - |
| Enhanced Data Collection | C/CPFF | UT/ARL : TX | 2.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.000 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603553N / *Surface ASW* | Project (Number/Name)<br>1704 / *Undersea Warfare* | |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Subtotal** | 37.927 | 0.919 | | 1.016 | | 1.020 | | - | | 1.020 | Continuing | Continuing | N/A |

**Remarks**

*Consists of multiple performing activities with funding for each not greater than $1M per year.

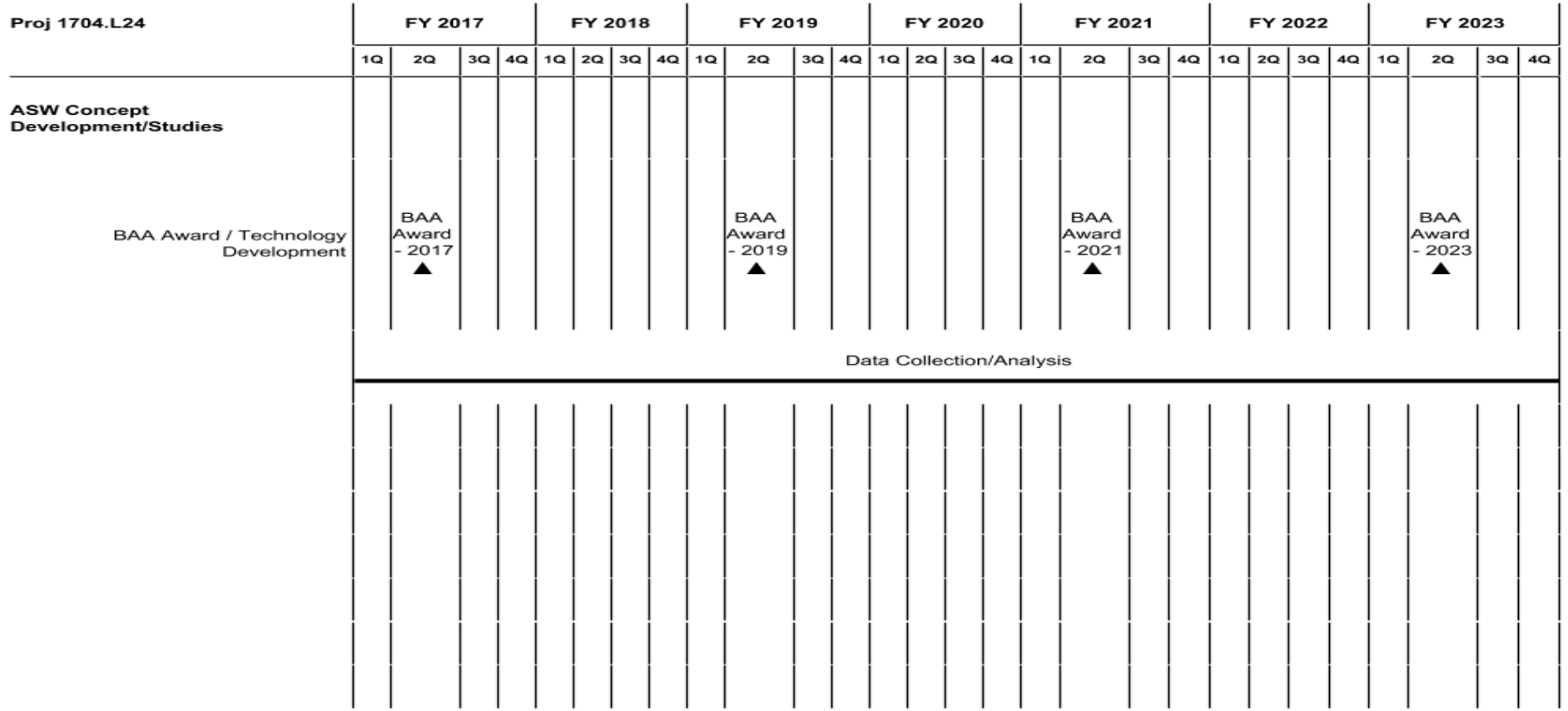
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management Support | C/CPAF | BAE Systems : MD | 4.824 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 4.824 | - |
| Program Management Support | C/CPIF | CGI Federal : VA | 0.120 | 0.120 | Nov 2016 | 0.120 | Feb 2018 | 0.102 | Dec 2018 | - | | 0.102 | Continuing | Continuing | Continuing |
| Travel | Allot | NAVSEA PEO IWS 5 : DC | 0.300 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.300 | - |
| Travel (LRS) | Allot | ONR : DC | 0.050 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.050 | - |
| | | **Subtotal** | 5.294 | 0.120 | | 0.120 | | 0.102 | | - | | 0.102 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 185.861 | 1.039 | | 1.136 | | 1.122 | | - | | 1.122 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603553N / *Surface ASW* | **Project (Number/Name)**<br>1704 / *Undersea Warfare* |




*2019PB - 0603553N - 1704.L24*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603553N / *Surface ASW* | **Project (Number/Name)**<br>1704 / *Undersea Warfare* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 1704.L24*** | | | | |
| ASW Concept Development/Studies: BAA Award / Technology Development: BAA Award - 2017 | 2 | 2017 | 2 | 2017 |
| ASW Concept Development/Studies: BAA Award / Technology Development: BAA Award - 2019 | 2 | 2019 | 2 | 2019 |
| ASW Concept Development/Studies: BAA Award / Technology Development: BAA Award - 2021 | 2 | 2021 | 2 | 2021 |
| ASW Concept Development/Studies: BAA Award / Technology Development: BAA Award - 2023 | 2 | 2023 | 2 | 2023 |
| ASW Concept Development/Studies: BAA Award / Technology Development: Data Collection/Analysis | 1 | 2017 | 4 | 2023 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603561N *I Advanced Submarine System Development* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 933.435 | 120.289 | 100.955 | 109.086 | - | 109.086 | 113.460 | 107.884 | 105.832 | 111.793 | Continuing | Continuing |
| 0223: *Sub Combat System Improvement (ADV)* | 485.968 | 40.626 | 40.828 | 47.118 | - | 47.118 | 49.531 | 51.708 | 51.954 | 53.053 | Continuing | Continuing |
| 2033: *Adv Submarine Systems Development* | 447.467 | 51.684 | 35.795 | 30.685 | - | 30.685 | 32.589 | 34.917 | 34.923 | 35.774 | Continuing | Continuing |
| 2096: *Payload Delivery Development* | 0.000 | 3.800 | 15.738 | 22.956 | - | 22.956 | 22.887 | 12.659 | 10.188 | 14.012 | Continuing | Continuing |
| 3391: *SSN/SSGN Survivability Program* | 0.000 | 0.000 | 8.594 | 8.327 | - | 8.327 | 8.453 | 8.600 | 8.767 | 8.954 | Continuing | Continuing |
| 9999: *Congressional Adds* | 0.000 | 24.179 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 24.179 |

**A. Mission Description and Budget Item Justification**

This program element supports innovative research and development in submarine Hull, Mechanical and Electrical (HM&E) and combat systems technologies and the subsequent evaluation, demonstration, and validation for submarine platforms. It will increase the submarine technology base and provide subsystem design options not currently feasible. The program element also supports programs transitioning from Science and Technology (S&T), Defense Advanced Research Projects Agency (DARPA), Independent Research and Development, and Small Business Innovation Research (SBIR) projects.

Project 0223: The Submarine Combat System Improvement (Advanced) (Non-ACAT) Project researches, develops, and tests new sonar, combat system, imaging, and electronic warfare software and develops, tests, and prototypes new sonar arrays for Program Executive Office Submarine (PEO SUB) programs, delivering about thirty (30) new capabilities every other year. This Project supports Navy Submarine Acoustic Superiority and Technology Insertion Initiatives through the application of advanced development and testing of sensors and sensor processing systems supporting tactical control systems improvements. Improvements are supportive of A Cooperative Strategy for 21st Century Sea Power and the Chief of Naval Operations (CNO) Design for Maintaining Maritime Superiority; addressing all components to include Strengthen Naval Power At and From Sea, Achieve High Velocity Learning, Strengthen Our Navy Team for the Future, and Expand and Strengthen Our Network of Partners. This Project addresses threats posed by China, Russia, Iran, Korea and Terrorism (CRIKT), improved lethality of U.S. Submarine Forces and 3rd Offset Capabilities in the Unmanned and Automated Systems domains.

Project 0223 is comprised of three major efforts: Advanced Processing Builds (APB), Flank Array Demonstration, and Advanced Sensors.

APB develops, tests and transitions capabilities for:
- APB Acoustics, transitioning to AN/BQQ-10
- APB Tactical Control, transitioning to AN/BYG-1
- APB Imaging, transitioning to AN/BVY-1

- APB Electronic Warfare (EW), transitioning to AN/BLQ-10

Flank Array Demonstration develops signal processing, integrates improvements and conducts testing and analysis for large array configurations. Improvements are transitioned to PEO SUB for fielding on the Virginia Class submarines.

Advanced Sensors develops new technologies for Hull Mounted and Towed Arrays. Hull Mounted improvements support submarine applications only. Towed array improvements are shared to support surface and surveillance applications, as well.

Project 2033:
The Advanced Submarine Systems Development (ASSD) Program is a non-acquisition program that develops and matures technologies for successful integration into future and modernized submarine classes, thus lowering acquisition and life cycle program costs while improving mission capability. ASSD transitions Hull, Mechanical, and Electrical (HM&E) technologies and future naval concepts from Science & Technology (S&T) and Research and Development (R&D) to operational platforms; performs tests and demonstrates submarine design and naval architecture products destined for integration into future submarine classes or backfit into existing fleet assets; develops, initially integrates, and does test validation of leading payload concepts for submarine integration in support of the Design for Undersea Warfare; and operates unique R&D experimentation, modeling, testing and simulation facilities to enhance submarine stealth, maneuverability, capability, and affordability. The program also supports Small Business Innovation Research (SBIR), Small Business Technology Transfer (STTR), Office of Naval Research (ONR), Defense Advanced Research Projects Agency (DARPA) programs, and near and mid-term technology insertion to achieve future submarine class total ownership cost reductions, and influence future submarine concept designs and core technologies. Experimentation and demonstration is conducted in a joint warfighting context with other services, (i.e. the U.S. Marines, U.S. Army, and the U.S. Air Force), to enable early assessment of warfighting capabilities, and to contribute to smarter technology selection decisions for potential incremental development. This program also supports Information Exchange Programs and joint Project Agreements (PA) with the United Kingdom, Canada, Australia and other international partners.

Project 2033 is comprised of three budget categories: Strategic Capability Infrastructure, Long Range R&D Investment, Rapid Prototyping.

The major developmental efforts include:

Strategic Capability Infrastructure
- Large Scale Vehicle (LSV)
- Intermediate Scale Measurement System (ISMS)

Long Range R&D Investment
- Advanced Submarine Control (Secondary Propulsion System)
- Advanced Material Propeller (AMP) Technology
- Innovation Technology Transition (SBIRs/STTRs)
- Next Generation Attack Submarine (SSN(X)) Technologies
- Next Generation (NG) Thrust

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603561N *I Advanced Submarine System Development* |

- Submarine Signature Management/Acoustic Superiority
- Advanced Hull Coatings
- Next Generation Towed Array Reliability
- Support of ONR Future Naval Capability (FNC) new starts
- Hydraulic Elimination through Electrification

Rapid Prototyping
- Common Unmanned Aerial Vehicle (UAS) Comms
- Fleet Module Autonomous Underwater Vehicle (FMUAV)
- Li-Ion Battery FMAUV Submarine Integration
- Clandestine Delivered Mine (CDM)
- Advanced Weapons Enhanced by Submarine UAS against Mobile targets (AWESUM)/Blackwing Unmanned Aerial System (UAS)
- Submarine Payload Integration
- Electronic Warfare/Intelligence Surveillance and Reconnaissance (EW/ISR) Unmanned Underwater Vehicle (UUV) Payload
- Submarine Launch Decoy

Project 2096:
Payload Delivery Development, consists of two (2) sub-projects:

- Payload Handling System (PHS)
- 3" Sub Launched Unmanned "K" Aerial System (SL-UKAS)

Payload Delivery Development is a non-acquisition program that supports innovative research and development efforts to enable integration of deployable and/or retrievable undersea vehicles, payload concepts, and offboard systems through design, manufacture, test/demonstration, evaluation, and validation for submarine platforms. In addition to technology development, the program will support engineering and integration of new and existing technologies to enable rapid prototyping and fielding of capabilities which will inform and provide solutions to urgent war-fighter needs. Experimentation will be conducted with the Fleet (i.e., Commander, Naval Submarine Forces (COMSUBFOR), Unmanned Undersea Vehicle Squadron One (UUVRON ONE), etc.), enabling an agile environment through at-sea demonstrations, which will provide Fleet and acquisition stakeholders with relevant payload employment data to inform Concepts of Operations (CONOPs) and fielding decisions. The program will furthermore support transition of high-interest systems and/or payloads from research and development to Programs of Record (PoRs), as appropriate.

Project 3391:
SSN/SSGN Survivability Program (S3P) efforts previously funded under project 2033(through FY17) will move to Project 3391 in FY18. S3P addresses gaps in stealth and the survivability for current and future SSN/SSGN force.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603561N *I Advanced Submarine System Development* |

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 106.365 | 100.955 | 114.588 | - | 114.588 |
| Current President's Budget | 120.289 | 100.955 | 109.086 | - | 109.086 |
| Total Adjustments | 13.924 | 0.000 | -5.502 | - | -5.502 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -3.378 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | -3.782 | - | -3.782 |
| • Rate/Misc Adjustments | 0.001 | 0.000 | -1.720 | - | -1.720 |
| • Congressional General Reductions Adjustments | -0.157 | - | - | - | - |
| • Congressional Directed Reductions Adjustments | -7.542 | - | - | - | - |
| • Congressional Add Adjustments | 25.000 | - | - | - | - |

| Congressional Add Details ($ in Millions, and Includes General Reductions) | FY 2017 | FY 2018 |
|---|---|---|
| **Project:** 9999: *Congressional Adds* | | |
| Congressional Add: *Advanced Materials Propeller Research* | 24.179 | 0.000 |
| Congressional Add Subtotals for Project: 9999 | 24.179 | 0.000 |
| Congressional Add Totals for all Projects | 24.179 | 0.000 |

**Change Summary Explanation**

Funding:

FY 2017: Net PE increase of $13.924M including: $+25.0M for the Advanced Materials Propeller Research Congressional Add; -$7.699M for directed Congressional Adjustments; and -$3.378M for Small Business Innovative Research (SBIR) assessment.
The FY 2019 funding request was reduced by $4.1 million to account for the availability of prior year execution balances.

Project 0223:

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603561N *I Advanced Submarine System Development* |

- The net FY 2018 to FY 2019 budget increase of $+6.290M was driven by the requirement to significantly expand APB advanced development efforts. Advancing capabilities of adversary navies require the application of emerging state-of-the-art computing technologies and development of capabilities in non-traditional tactical areas to compliment the core APB domain. The APB development budget, which began with a limited portfolio developing Towed Array Signal Processing improvements, has since expanded over time, and is required to address Hull Arrays, Tactical Control, Tactical Decision Aids, Active Intercept & Receive, Imaging, Operator Interface Modernization, Command Tool Development, and more recently EW. The APB budget increase in FY 2019 is needed to properly resource its breadth of requirements. The increase in APB is provided to establish a needed land-based EW capability development laboratory system; conduct new EW algorithm development; pursue the use of Big Data Analytics; Machine Learning and Artificial Intelligence (AI) computing techniques; develop new automation tools and processing for Unmanned Vehicles; and develop automated tools related to CRIKT. APB development added EW to its portfolio in FY 2017 and initial efforts included establishing a systems engineering approach, hiring national-level Subject Matter Experts (SMEs), and collecting data that will be used to initiate new capability development. Efforts in FY 2019 will build on this foundation with further data collections, system refinements, new capability development, and transition to operational use. The ability of our Submarines to operate covertly in forward areas is challenged by the emergence and wide spread use of modern commercial and military radars that exploit software-defined radio technology and can alter their operating characteristics on-the-fly with the use of a thumb drive. These radars and their waveforms are evolving quickly and are expected to continue to present a rapidly moving target for U.S. EW capabilities to keep pace with. A robust APB EW program is needed to enable our Submarines to continue to operate safely and effectively into the future. The use of modern computing technologies and new automation techniques are required to outpace emerging threat platforms that are rapidly becoming more difficult to detect. The FY 2019 decrease in the Flank Array Demo (FAD) effort is as originally planned and is based on the focus shift from more costly at-sea testing in FY 2018 to predominantly test result analysis in FY 2019.

The FY 2019 funding request was reduced by $2.000 million to account for the availability of prior year execution balances.

Project 2033:

FY 2017: Program Adjustments support CNO Speed to Fleet Initiative for ISR/EW UUV and At-sea rapid prototyping, integration, and advanced submarine payloads demonstration. Additionally increase was programmed by CNO for design and procurement of materials for an advanced coatings demonstration as part of the Acoustic Superiority demonstrator (South Dakota Insertion Program - SSN 790). +$5.8M in the Request for Additional Appropriation to fund a Joint Emergent Operational Need Statement (JEONS) through the development and rapid prototyping of the Clandestine Delivered Mine (CDM).
FY 2018: Increase in the Strategic R&D infrastructure due to obsolescence and tracking range upgrades for LSV-2. This includes installation of new steering and diving prototype funded by FY16 congressional add. Decrease in long-range R&D is due to completion of procurement of long-lead materials (hull treatment) for the SSN-790 demonstration.
FY 2019: Increase in Strategic R&D infrastructure due to obsolescence and tracking range upgrades for LSV-2 at ARD Bayview. Conduct design and approval process for replacement Inverter and Converter modules, procure materials and construct prototype units, test units, and revise design as necessary to prepare for full-ship-set production.

The FY 2019 funding request was reduced by $2.100 million to account for the availability of prior year execution balances.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603561N *I Advanced Submarine System Development* |

Project 2096:

FY 2017: Decrease of $4.592 for Payload Handling System (PHS) excess growth. New start program in FY17.
FY 2018 to FY 2019: PHS program growth from FY18 to FY19 is required for Long Lead Time Material (LLTM) procurement in order to maintain schedule for installation and testing onboard an SSGN. Additional program growth includes component prototype development and testing, and design and engineering team support.
FY 2019: Increase of $3.498 for Submarine Payload Handling System (PHS).

Project 3391:

Established in FY18. SSN/SSGN Survivability Program (S3P) previously funded under Project 2033 through FY17.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603561N / *Advanced Submarine System Development* | Project (Number/Name)<br>0223 / *Sub Combat System Improvement (ADV)* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0223: *Sub Combat System Improvement (ADV)* | 485.968 | 40.626 | 40.828 | 47.118 | - | 47.118 | 49.531 | 51.708 | 51.954 | 53.053 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The Submarine Combat System Improvement (Advanced) (Non-ACAT) Project addresses technology challenges to improve tactical control in littoral and open ocean environments for a variety of operational missions including peacetime engagement, surveillance, battle space preparation, deterrence, regional sea denial, precision strike, task group support, and ground warfare support. These technologies, developed by Navy technology bases, the private sector, ONR, FNC, and DARPA are then transitioned. Prototype hardware/software systems are developed to demonstrate technologically promising system concepts in laboratory and at-sea submarine environments. The Advanced Sensor development program develops and tests new sensors and demonstrates large array configurations. Current efforts are directed at Towed Array sensor technologies, telemetry, and architecture, to improve reliability and performance while decreasing program life cycle costs. For large array configurations, Conformal Acoustic Velocity Sonar (CAVES), Wide Aperture Array (WAA), Large Vertical Aperture (LVA) and Large Flank Array (LFA) technologies are also being pursued. The focus of sensor processing technology efforts through the APB program will address improvements in imaging, tactical control, Electronic Warfare (EW) and acoustics, including detection, localization, classification, ranging, tracking, situational awareness, tactical decision aides, command decision support tools and displays and other functions essential to mission success. APB will also begin to develop capabilities related to Unmanned Aerial and Undersea Vehicles and automated technologies specific to CRIKT.

Technologies and/or capabilities developed under this Project will be shared, as applicable to reduce costs and optimize reuse, with development programs for surface ship sonar, Advanced Capability Build (ACB) and surveillance platforms, Advanced Surveillance Build (ASB). All three programs (ACB, ASB and APB) are managed under a common development process titled AxB. While each platform retains its uniqueness and focus in functional domains essential to mission success, a premium is placed on development of common capabilities and modular architecture technologies to maximize commonality and cost effectiveness.

This Project will participate in, and take advantage of, the Tactical Advancements for the Next Generation (TANG) initiative that utilizes Commercial Industrial Design Thinking methodologies to engage the Fleet in generating innovative improvement concepts for Submarine, Surface and Surveillance systems.

The FY 2019 funding request was reduced by $2.0 million to account for the availability of prior year execution balances.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Advanced Processing Build (APB) | 35.151 | 35.053 | 41.993 | 0.000 | 41.993 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** APB is a four Step process: | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>0223 / *Sub Combat System Improvement (ADV)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Step 1 - algorithm/technology assessment by peer review panels of Subject Matter Experts (SME) to down-select technologies and assist developers with technical guidance.<br>Step 2 - algorithm/technology testing with open and closed data sets to further down-select and refine capabilities prior to integration and testing.<br>Step 3 - land-based system-level testing stimulated by the Submarine Multi-Mission Team Trainer (SMMTT), in a realistic tactical environment.<br>Step 4 - at-sea testing on an operational submarine.<br><br>APB requirements are generated by the Submarine Tactical Requirements Group (STRG), a group of senior post command officers chaired by the Flag Officer, Director of Undersea Warfare Development Center (UWDC). Requirements are vetted by COMSUBPAC and COMSUBFOR, then provided as direction by CNO, N97. PEO SUB provides Milestone Decision Authority (MDA) oversight and approval. Beginning in FY17, Steps 1 and 2 are conducted in a pipeline style, parallel to system integration and production. This makes Steps 1 and 2 independent of any particular Build (e.g APB-15) and allows for development of longer lead technologies. The content of a specific APB build (every two years on the odd year) will then be determined through a series of discussions with the Fleet/STRG aimed at selecting the most relevant and mature technologies available in the APB pipeline. Integration at the String and System level will then be performed followed by Steps 3 and 4, as applicable, and transition to production.<br><br>***FY 2018 Plans:***<br>- Continue the development of APB-17, complete integration for testing, conduct Step 3 land-based laboratory testing and Step 4 at-sea testing and analysis. Transition APB-17 to PEO SUB for production. Establish a Tactical Scenario Guide and conduct a Watch Section Task Analysis (WSTA) Gaps and Seams test to inform system shortfalls in the context of the selected scenarios.<br>- Collaborate with the STRG and UWDC to prepare a multi-year capability development road map to inform the content of the APB Pipeline. Initiate planning and development efforts on APB Pipeline capabilities.<br>- Continue development of a STDA common to submarine, surface, and surveillance applications.<br>- Continue EW APB development program. Analyze data collected in FY 2017. Continue systems engineering studies to determine required legacy system hardware and software architecture modernization requirements. Respond to Fleet requirements for APB-19 capabilities. Initiate selection of candidate capabilities from APB conveyor that meet Fleet requirements and commence development of gap capabilities not resident on the | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>0223 / *Sub Combat System Improvement (ADV)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| conveyor. Conduct Step 1 and Step 2 testing and initiate the APB-19 systems engineering build design process. Focus of APB-19 is expected to be EW and ASW against advanced threats.<br><br>***FY 2019 Base Plans:***<br>- Continue advanced concepts, data collection and analysis for EW APB. Anticipate integrating and testing advanced capabilities into the Next Generation EW Architecture provided by PEO SUBS.<br>- Establish EW APB land-based development environment. Expect to design and procure signal processors, tuners, high speed data recorders, and advanced simulation and stimulation equipment. The development environment should be able to simulate or ingest real world radar data.<br>- Initiate industry participation in EW development. Accept industry innovations for testing at land-based facilities.<br>- Initiate integration of successful capabilities into APB-21 baseline.<br>- Develop improved EW direction finding, environmental assessment, and detection algorithms. Initiate studies and capability development for electronic attack.<br>- Continue development of a STDA common to submarine, surface, and surveillance applications. Begin to export basic development products to Surface and Surveillance programs.<br>- Initiate studies on the use of Machine Learning, AI, and Big Data Analytics. Seek system performance improvements and 3rd Offset (automation) capabilities not currently achievable with legacy technology.<br>- Initiate development of automated technologies specific to CRIKT, targeting particular vulnerabilities.<br>- Integrate APB-19 capabilities and initiate Step-3 land based testing.<br>- Continue Step 1 and Step 2 development and testing of concepts, algorithms, and technologies in response to Fleet requirements consistent with the multi-year capability development road map developed in FY 2018.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>The FY 2019 increase is driven by the requirement to significantly expand APB advanced development efforts. Advancing capabilities of adversary navies require the application of emerging state-of-the-art computing technologies and development of capabilities in non-traditional tactical areas to compliment the core APB domain. The APB development budget, which began with a limited portfolio developing Towed Array Signal Processing improvements, has since expanded over time, and is required to address Hull Arrays, Tactical Control, Tactical Decision Aids, Active Intercept & Receive, Imaging, Operator Interface Modernization, Command Tool Development, and more recently EW. The APB budget increase in FY 2019 is needed to properly resource its breadth of requirements. The increase in APB is provided to establish a needed land- | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>0223 / *Sub Combat System Improvement (ADV)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| based EW capability development laboratory system; conduct new EW algorithm development; pursue the use of Big Data Analytics; Machine Learning and Artificial Intelligence (AI) computing techniques; develop new automation tools and processing for Unmanned Vehicles; and develop automated tools related to CRIKT. APB development added EW to its portfolio in FY 2017 and initial efforts included establishing a systems engineering approach, hiring national-level Subject Matter Experts (SMEs), and collecting data that will be used to initiate new capability development. Efforts in FY 2019 will build on this foundation with further data collections, system refinements, new capability development, and transition to operational use. The ability of our Submarines to operate covertly in forward areas is challenged by the emergence and wide spread use of modern commercial and military radars that exploit software-defined radio technology and can alter their operating characteristics on-the-fly with the use of a thumb drive. These radars and their waveforms are evolving quickly and are expected to continue to present a rapidly moving target for U.S. EW capabilities to keep pace with. A robust APB EW program is needed to enable our Submarines to continue to operate safely and effectively into the future. The use of modern computing technologies and new automation techniques are required to outpace emerging threat platforms that are rapidly becoming more difficult to detect. | | | | | |
| ***Title:*** Flank Array Demonstration | 1.675 | 1.975 | 1.325 | 0.000 | 1.325 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>- Continue development of beamforming and signal processing improvements to maximize LFA capability as well as tactical/combat system updates making use of improved capabilities to perform target localization.<br>- Conduct two critical at-sea testing events for LVA2 (installed on USS Maryland) and analyze FY 2016/FY 2017 at-sea test results. This testing/analysis is necessary to integrate enhanced signal processing capability for LVAs and to collect data that will be used to improve LVA tactical performance. These processing upgrades are directly applicable to improving the forward and back-fit LVA production programs for Virginia Class Submarines, SSBN's, and Ohio Replacement Submarines. The planned increase supports critical at-sea testing events and the analysis of FY 2016/FY 2017 at-sea test results. | | | | | |
| ***FY 2019 Base Plans:***<br>- Continue to conduct critical at-sea testing events for LVA2 and analyze FY 2017/FY 2018 at-sea test results. This testing/analysis is necessary to integrate enhanced signal processing capability for LFAs and collect data that will be used to improve LVA tactical performance. These processing upgrades are directly applicable to | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>0223 / *Sub Combat System Improvement (ADV)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| improving the forward and backfit LVA production programs for Virginia Class Submarines, SSBN's, and Ohio Replacement Submarines.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>The FY 2019 decrease is as originally planned and is based on the focus shift from at-sea testing in FY 2018 to predominantly test result analysis in FY 2019. | | | | | |
| ***Title:*** Advanced Sensors | 3.800 | 3.800 | 3.800 | 0.000 | 3.800 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>- Continue embedded sensor and OAT component development.<br>- Complete second generation OAT component development and design and fabricate towed array modules using OAT to demonstrate high bandwidth operation and dual sample rate capability. Develop initial draft of Interface Control Documents (ICD) for OAT components.<br>- Incorporate lessons learned from FY 2017 Lake Pend Oreille (LPO) testing into FY 2018 array module designs. Update telemetry system layout, architecture, and component designs. Conduct array environmental, calibration, and LPO tow testing of FY 2018 array modules.<br>- Continue development of active and passive sensor concepts to support performance requirements for BCA. Begin preliminary test panel design and procure materials in support of FY 2018 testing.<br>***FY 2019 Base Plans:***<br>- Incorporate lessons learned from FY 2018 LPO testing into FY 2019 array module design. Complete OAT component development, system architecture, and associated ICDs. Conduct array environmental, calibration, and LPO testing of FY 2019 array modules.<br>- Begin procurement and fabrication of full length OAT array Advance Development Model (ADM).<br>- Continue development of the High Speed Signal Path (HSSP).<br>- Continue development of active and passive sensor concepts to support performance requirements for BCA. Begin test panel design and procure materials in support of FY 2019 testing.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>0223 / *Sub Combat System Improvement (ADV)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| No significant change in FY18 to FY19 requested funding in accordance with program's plan. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 40.626 | 40.828 | 47.118 | 0.000 | 47.118 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Use competitively awarded contracts from Broad BAA solicitations and SBIR initiatives. Integration to fielded systems performed under contracts awarded by the recipient production program within PEO SUB.

**E. Performance Metrics**

- APB: Deliver at-sea tested submarine capability improvements to PEO SUB as prescribed by the Fleet every two years. Conduct milestone reviews with the Milestone Decision Authority (MDA), PEO SUB prior to delivery.
- Deliver Next Generation TB-29(x) optimum sensor evaluation report.
- Deliver Fat Line Vector Sensor Towed Array (VSTA) Lake Pend Oreille test reports.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603561N / *Advanced Submarine System Development* | Project (Number/Name)<br>0223 / *Sub Combat System Improvement (ADV)* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Product Development | C/CPFF | Adaptive Methods : VA | 1.425 | 0.250 | Dec 2016 | 0.250 | Jan 2018 | 0.300 | Dec 2018 | - | | 0.300 | 0.000 | 2.225 | Continuing |
| Product Development | C/CPFF | Alion Sciences : VA | 3.267 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.267 | Continuing |
| Product Development | C/CPFF | Arete : CA | 0.550 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.550 | - |
| Product Development | C/CPFF | Chesapeake Science (L-3) : MD | 7.551 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 7.551 | Continuing |
| Product Development | C/CPFF | Electric Boat : ME | 1.785 | 0.070 | Jul 2017 | 0.070 | Mar 2018 | 0.070 | Dec 2018 | - | | 0.070 | Continuing | Continuing | Continuing |
| Product Development | C/CPFF | General Dynamics : VA | 22.031 | 2.000 | Dec 2016 | 2.500 | Feb 2018 | 3.030 | Dec 2018 | - | | 3.030 | Continuing | Continuing | Continuing |
| Product Development | C/CPFF | GA Tech Research Institute : GA | 3.076 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.076 | Continuing |
| Product Development | C/CPFF | In Depth Engineering : VA | 5.365 | 0.970 | Nov 2016 | 0.500 | Dec 2017 | 0.990 | Dec 2018 | - | | 0.990 | Continuing | Continuing | Continuing |
| Product Development | C/CPFF | JHU/APL : MD | 93.355 | 8.541 | Nov 2016 | 9.400 | Nov 2017 | 9.884 | Dec 2018 | - | | 9.884 | Continuing | Continuing | Continuing |
| Product Development | C/CPFF | Lockheed Martin : VA | 63.478 | 7.812 | Nov 2016 | 8.535 | Nov 2017 | 8.998 | Dec 2018 | - | | 8.998 | Continuing | Continuing | Continuing |
| Product Development | C/CPFF | Lockheed Martin : NY | 9.564 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 9.564 | Continuing |
| Product Development | C/CPFF | Metron : VA | 7.253 | 0.900 | Nov 2016 | 1.000 | Nov 2017 | 1.595 | Dec 2018 | - | | 1.595 | Continuing | Continuing | Continuing |
| Product Development | WR | NSWC/Carderock : MD | 27.299 | 2.535 | Oct 2016 | 2.585 | Oct 2017 | 2.720 | Nov 2018 | - | | 2.720 | Continuing | Continuing | Continuing |
| Product Development | WR | NUWC/Newport : RI | 94.245 | 6.868 | Nov 2016 | 6.480 | Oct 2017 | 7.670 | Nov 2018 | - | | 7.670 | Continuing | Continuing | Continuing |
| Product Development | C/CPAF | NSMA : VA | 11.894 | 0.550 | Feb 2017 | 0.650 | Apr 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Product Development | WR | ONI : DC | 2.295 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.295 | Continuing |
| Product Development | WR | ONR : VA | 2.725 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.725 | Continuing |
| Product Development | C/CPFF | Progeny : VA | 7.739 | 0.535 | Nov 2016 | 0.650 | Feb 2018 | 0.640 | Feb 2019 | - | | 0.640 | Continuing | Continuing | Continuing |
| Product Development | C/CPFF | PSU/ARL : PA | 9.480 | 0.850 | Nov 2016 | 0.650 | Dec 2017 | 0.650 | Dec 2018 | - | | 0.650 | Continuing | Continuing | Continuing |
| Product Development | C/CPFF | SAIC : VA | 3.555 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.555 | Continuing |
| Product Development | C/CPFF | Sedna Digital : VA | 12.264 | 1.600 | Feb 2017 | 1.650 | Dec 2017 | 1.830 | Dec 2018 | - | | 1.830 | Continuing | Continuing | Continuing |
| Product Development | WR | SSC/San Diego : CA | 1.963 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.963 | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>0223 / *Sub Combat System Improvement (ADV)* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Product Development | MIPR | U.S. Army Research Lab : MD | 1.700 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.700 | Continuing |
| Product Development | MIPR | U.S. Army/MITRE : NJ | 4.595 | 0.000 | | 1.408 | Dec 2017 | 1.435 | Dec 2018 | - | | 1.435 | Continuing | Continuing | Continuing |
| Product Development | MIPR | U.S. Hanscom AFB/ MIT Lincoln Labs : MA | 17.289 | 2.080 | Dec 2016 | 2.150 | Dec 2017 | 2.525 | Dec 2018 | - | | 2.525 | Continuing | Continuing | Continuing |
| Product Development | C/CPFF | UT/ARL : TX | 28.809 | 0.775 | Nov 2016 | 0.700 | Dec 2017 | 0.800 | Dec 2018 | - | | 0.800 | Continuing | Continuing | Continuing |
| Product Development | C/CPFF | VAR : VAR* | 22.723 | 3.232 | Dec 2016 | 0.592 | Dec 2017 | 3.069 | Dec 2018 | - | | 3.069 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 467.275 | 39.568 | | 39.770 | | 46.206 | | - | | 46.206 | Continuing | Continuing | N/A |

**Remarks**

*Consists of multiple performing activities with funding for each not greater than $1M per year.

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Need Item Text | C/BA | Not Specified : Not Specified | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | N/A |

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management Support | C/CPAF | BAE Systems : MD | 12.665 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 12.665 | Continuing |
| Program Management Support | C/CPIF | CGI Federal : VA | 1.000 | 1.000 | May 2017 | 1.000 | Feb 2018 | 0.854 | Dec 2018 | - | | 0.854 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603561N / *Advanced Submarine System Development* | Project (Number/Name)<br>0223 / *Sub Combat System Improvement (ADV)* | |

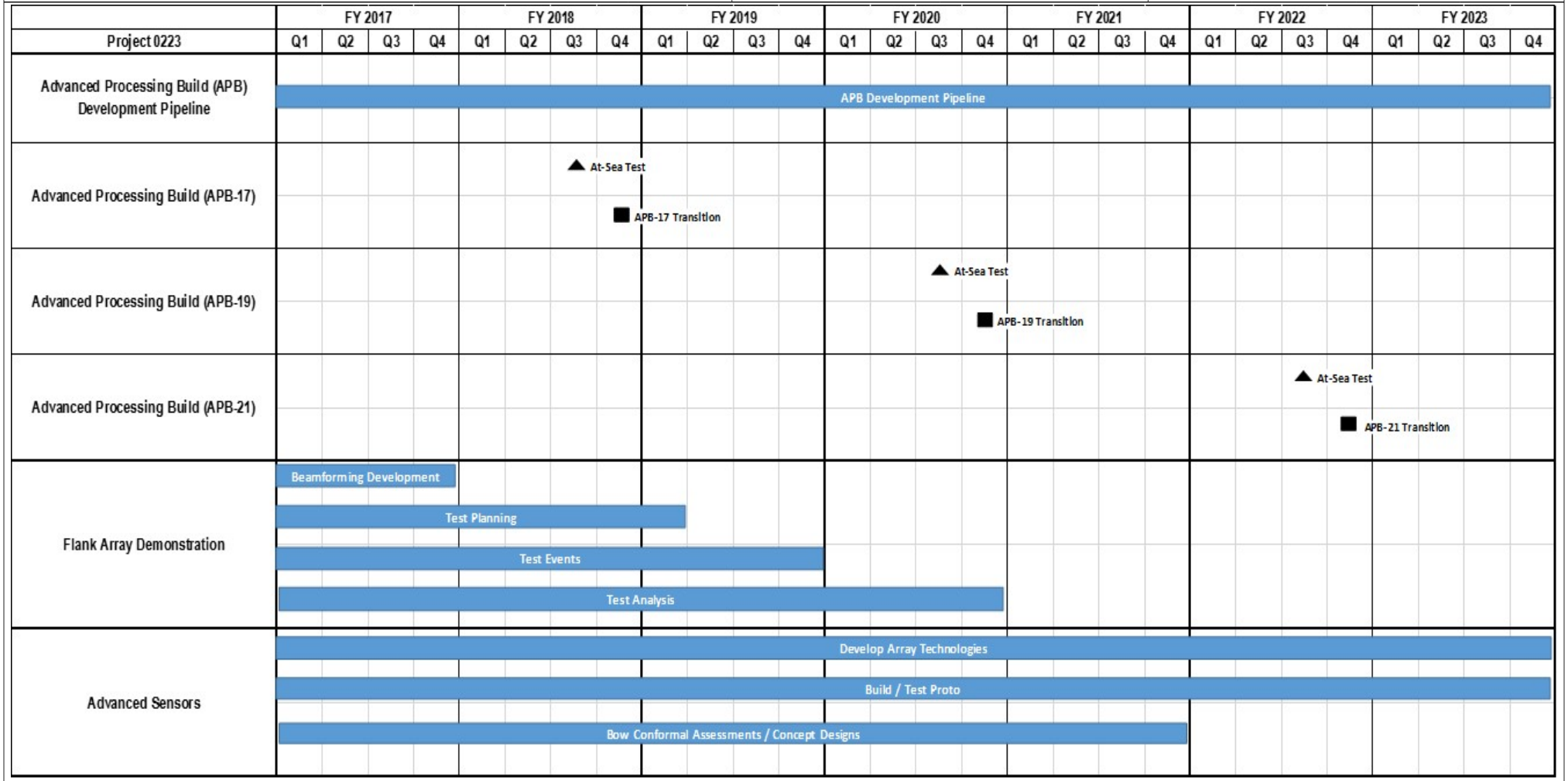
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management Support | C/CPFF | EG&G (URS) : VA | 4.291 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 4.291 | Continuing |
| Travel | Allot | NAVSEA PEO IWS5 : DC | 0.737 | 0.058 | Dec 2016 | 0.058 | Jan 2018 | 0.058 | Oct 2018 | - | | 0.058 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 18.693 | 1.058 | | 1.058 | | 0.912 | | - | | 0.912 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 485.968 | 40.626 | | 40.828 | | 47.118 | | - | | 47.118 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>0223 / *Sub Combat System Improvement (ADV)* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>0223 / *Sub Combat System Improvement (ADV)* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 0223*** | | | | |
| Advanced Processing Build (APB): APB Development | 1 | 2017 | 4 | 2023 |
| Advanced Processing Build (APB): APB-17: APB-17 At-Sea Test | 3 | 2018 | 3 | 2018 |
| Advanced Processing Build (APB): APB-17: Transition APB-17 to PEO SUB Production Programs | 4 | 2018 | 4 | 2018 |
| Advanced Processing Build (APB): APB-19: APB-19 At-Sea Test | 3 | 2020 | 3 | 2020 |
| Advanced Processing Build (APB): APB-19: Transition APB-19 to PEO SUB Production Programs | 4 | 2020 | 4 | 2020 |
| Advanced Processing Build (APB): APB-21: APB-21 At-Sea Test | 3 | 2022 | 3 | 2022 |
| Advanced Processing Build (APB): APB-21: Transition APB-21 to PEO SUB Production Programs | 4 | 2022 | 4 | 2022 |
| Flank Array: Beamforming Development | 1 | 2017 | 4 | 2017 |
| Flank Array: Flank Array Test Planning | 1 | 2017 | 1 | 2019 |
| Flank Array: Flank Array Test Conduct | 4 | 2017 | 4 | 2019 |
| Flank Array: Flank Array Test Analysis | 1 | 2017 | 4 | 2020 |
| Advanced Sensors: Develop Array Technologies | 1 | 2017 | 4 | 2023 |
| Advanced Sensors: Build & Test Prototype Arrays | 1 | 2017 | 4 | 2023 |
| Advanced Sensors: Bow Conformal Assessments / Concept Designs | 1 | 2017 | 4 | 2021 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603561N / *Advanced Submarine System Development* | Project (Number/Name)<br>2033 / *Adv Submarine Systems Development* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2033: *Adv Submarine Systems Development* | 447.467 | 51.684 | 35.795 | 30.685 | - | 30.685 | 32.589 | 34.917 | 34.923 | 35.774 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The Advanced Submarine Systems Development (ASSD) Program is a non-acquisition program that develops and matures advanced technologies for successful integration into current and future submarine classes and in so doing lowers the technical and cost risks of integrating these new technologies prior to acquisition and speeds their delivery as capabilities into the Fleet and into formal Programs Of Record (PORs). ASSD transitions Hull, Mechanical, and Electrical (HM&E) technologies, payloads, and future naval concepts from the Science & Technology (S&T) and Research and Development (R&D) communities through the development, maturation, and technical integration of technology projects to operational submarine platforms for assessment, testing, and evaluation. Once the projects have proven their maturity and promise through at-sea testing they are formally transitioned into formal programs of record at lower risk and costs. Additionally, ASSD operates and maintains R&D infrastructure assets that are critical in the long-term design, assessment and construction of modern, stealthy submarine platforms.

The program works with Small Business Innovation Research (SBIR), Small Business Technology Transfer (STTR), Office of Secretary of Defense (OSD), Office of Naval Research (ONR), and Defense Advanced Research Projects Agency (DARPA) organizations to transition technology for integration into current and future submarine classes to achieve new transformational capabilities while achieving total-ownership cost reductions. Experimentation and demonstration are conducted in a joint warfighting context with other services, (i.e. the U.S. Marines, U.S. Army, and the U.S. Air Force), to enable early assessment of the new technology's warfighting capabilities, and to inform the fleet and acquisition community on smarter technology-selection decisions. This program also supports cooperative R&D through Information/Data Exchange Agreements (IEA/ DEA) and joint Project Arrangements (PA) with the United Kingdom, Australia and other international partners. These international cooperative activities achieve future submarine class total ownership cost reductions, and influence future submarine concept designs and core technologies. Overall, the technology efforts in ASSD develop future technologies that are to be integrated into the Virginia class, Columbia class, future submarines and in-service submarine programs.

Several programmatic budget changes are notable in this year's budget exhibits. (1) SEA073 has established new programmatic pillars to better align the different projects within Project 2033 (Strategic Capability R&D Infrastructure, Long Range R&D Investment, and Rapid Technology Development and Ship Integration). The specific project efforts within these new pillars have not changed other than new program starts and completions that are detailed below. (2) The SSN/SSGN Survivability Program (S3P) efforts previously funded under this project (through FY17) were moved to Project 3391 in FY18. The S3P program addresses gaps in stealth and the survivability for the current and future SSN/SSGN force. (3) The increase in funding from FY 2017 to FY 2018 in the Strategic Capability R&D Infrastructure pillar supports critical obsolescence upgrades to the Large Scale Vehicle (LSV-2) to enable its continued operation in support of the Columbia class propulsor test program and future submarine stealth improvements. These investments continue in FY19, (4) The decrease in funding in Long Range R&D is a result of the completion of material procurements and the surge in non-recurring engineering efforts to support installation of the advanced hull treatment advanced demonstrator effort as part of the Acoustic Superiority project on the USS South Dakota (SSN 790) starting in FY18. Future SEA073 investment in advanced hull treatments shifts to the transition of the materials developed as part of ONR's Future Naval Capability (FNC) program that will culminate in another at-sea demonstration in the FY21-22

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>2033 / *Adv Submarine Systems Development* |

timeframe. (5) Increase in FY17 Rapid Development due to OSD Supplemental Add for the Mining Expendable Delivery Unmanned Submarine Asset (MEDUSA formally named CDM/Bull Shark); next phase of project execution to complete design, fabricate system, and demonstrate on a 688 class submarine in FY20 has transitioned to Unmanned Maritime Systems program office (PMS406) as of Q4 FY17. Additional funding to cover efforts in FY18-20 are covered under PMS406 AUP/ AUWP funding lines.

Project 2033 is comprised of three programmatic budget categories: Strategic Capability R&D Infrastructure, Long Range R&D Investment, and Rapid Technology Development and Ship Integration. Strategic capability R&D infrastructure is investment to maintain and operate critical, one-of-a-kind submarine R&D assets that enable the design and manufacture of the stealthiest submarines in the world without the requirement to develop and test at full scale which is inordinately expensive and risky. Long-range R&D investment is the maturation and prototyping at full-scale of long- range (5-10 years) technologies to enable their maturation and readiness for incorporation into existing and future submarine baselines. The objective is to achieve high technology readiness (TRL-7) of the targeted technology so that it can be incorporated into the baseline submarine design during the detailed design contract award. Rapid technology development and ship integration projects are efforts designed to mature higher TRL capabilities and field the particular technology project capability within an 18-30 month window from program start to submarine at-sea demonstration. All projects are determined by senior USW leadership and N97 sponsor direction.

SEA073 additionally initiates seedling technology projects (<$800K/year) under the innovative technology transition effort to assess new technology candidates and keep the submarine/USW technology pipeline primed. This effort is executed in the Long-Range R&D investment pillar.

Major technology developmental efforts include:
Strategic Capability R&D Infrastructure
- Large Scale Vehicle (LSV)
- Intermediate Scale Measurement System (ISMS)

Long Range R&D
- Advanced Submarine Hull Coatings
- Advanced Signature Management
- Advanced Submarine Control/Stationkeeping
- Advanced Material Propeller/Next Generation Thrust (Future Propulsor/Shaft Technologies)
- Submarine Corrosion Control Technologies

Rapid Technology Development and Submarine Integration
- Common Unmanned Aerial Vehicle (UAS) Communications
- Fleet Modular Autonomous Undersea Vehicle (FMAUV)
- Li-Ion Battery for FMAUV Submarine Integration
- Mining Expendable Devlivery Unmanned Submarine Asset (MEDUSA). Project transitioned to Unmanned Maritime Systems program office via MOU for execution of Phase II
- Long-Range Deployable/Retrievable Instrumented Intelligence, Surveillance and Reconnaissance (ISR) Buoy

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>2033 / *Adv Submarine Systems Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Strategic Capability R&D Infrastructure | 14.825 | 18.046 | 18.046 | 0.000 | 18.046 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Sustains Navy R&D capability for continued operations of the Large Scale Vehicle (LSV-2) and the Intermediate Scale Measurement System (ISMS) test facility in support of VIRGINIA and COLUMBIA Class Programs (plus numerous other smaller programs) and future submarine technology development. Critical submarine stealth enabler. Facilities support the conduct of large scale model experiments for submarines. Facilities focus on evaluating the stealth, control, affordability, and operational effectiveness of new technologies that are prototyped on large-scale models. The technology validation provided by the models has provided significantly cost and schedule savings by allowing prototyping and development at just under full-scale vice with first-of-hull assets. | | | | | |
| ***FY 2018 Plans:***<br>Continue ongoing system upgrades and replacements per scheduled for ISMS. Execute LSV2 core ship systems maintenance, maintain crew qualification, ensure compliance with all LSVSAFE and general regulations. Complete guidance and navigation system upgrade. Upgrade acoustic array assets to support future testing; maintain and operate acoustic data systems and all required shore support systems, ensure calibration and setup of new tracking and control system. Begin build of steering and diving replacement unit. Continue critical COLUMBIA propulsor trials. Execute LSV2 alterations to support COLUMBIA signature and propulsor trials vehicle including tracking range. Execute requirements phase for LSV2 drive system replacement. | | | | | |
| ***FY 2019 Base Plans:***<br>Conduct LSV2 core ship systems maintenance, maintain crew qualification, ensure compliance with all LSVSAFE and general regulations, maintain and operate acoustic data systems and all required shore support systems. Operate and maintain ISMS acoustic test range underwater and shore-based facilities. Continue ongoing system upgrades and replacement on ISMS. Continue critical COLUMBIA propulsor trials, support advanced array hardware and systems maintenance. Support ship and system alterations to safely support COLUMBIA signature and propulsor trials. Install replacement of replacement steering and diving actuator system into LSV2. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***Title:*** Long Range R&D | 25.863 | 11.399 | 8.282 | 0.000 | 8.282 |
| ***Articles:*** | - | - | - | - | - |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
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| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>2033 / *Adv Submarine Systems Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Description:*** Develop advanced technologies and tools to increase current and future submarine capabilities, lower acquisition and life-cycle costs, and enhance the survivability of submarines. Develop technologies and Tactics, Techniques, and Procedures (TTPs) that facilitates new and enhance existing warfighting concepts. The program currently supports development of advanced submarine hull coatings for improved acoustic performance, maintainability, and cost with the objective of near-term implementation on VIRGINIA and COLUMBIA class platforms as well as future submarine classes. The budget line continues to develop technologies for submarine alternative propulsion and propulsor designs to enhance submarine maneuverability and stealth, and stern configurations with potential to significantly reduce submarine acquisition costs while increasing performance. Lastly, this long-range R&D continues to develop and demonstrate technologies for future submarines in areas of hull and platform technologies, propulsors, propellers, corrosion control, ship control, electric actuation, sensors, and self-defense systems that are providing near- term capability and cost reduction for in-service and future submarine classes.<br><br>***FY 2018 Plans:***<br>Complete corrosion FNC at-sea TEMPALT testing and baseline technologies in the Columbia, VA Block IV or V Classes. Conduct motor dynamometer testing, and in-water operational pressure testing of the ASC PPM 82 pump jet technology and initiate transition and shipboard integration efforts to introduce the technology as VA Block VI capability. Initiate planning and design for an Advanced Control Effectors technology prototype for land based testing demonstrator on 668 class submarine. Complete fatigue testing of the Advanced Material Propeller (AMP) Generation 2 full scale metallic hub and three composite blades in Australia. Complete the manufacture and testing of Generation 3 full-scale AMP metallic hub and all composite blades and ship to AUS in preparation for at-sea Collins class testing. Finalize trial plan priorities and obtain approval from US and AUS authorities that propeller is acceptable for trial. Continue to leverage products from Small Business and Independent Research and Development (IR&D) efforts. Execute advanced signature management trials on a submarine platform and conduct analysis to inform initial system requirements and capabilities. Assess and study new technologies for future submarines and perform studies to improve platform capability and performance in support of the Tactical Submarine Evolution Plan (TSEP).<br><br>Identify enabling technologies and submarine concept design integration characteristics. Initiate technology development efforts on critical, long-lead technologies. Continue to define and evaluate new/alternative Next Generation Thrust (NGT) technologies, design concepts, alternative materials and evaluate system configuration arrangements and initiate next gen propulsor technology project (classified details) for insertion in VA Block VII. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>2033 / *Adv Submarine Systems Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Start second US-UK Electromagnetics project arrangement with laboratory stress magnetization and electric model experiments on joint US/UK models and commencement of detailed planning for large-scale testing to perform underwater electric and magnetic signature testing utilizing US and UK asset(s) at a US range facility. Deliver materials and TDPs to support installation of new hull treatment on SSN 790. Initiate industrialization and large-scale testing of ONR advanced hull material candidates in cooperation with ONR MANTECH and begin initial planning for an at-sea demonstration on a VA class submarine.<br><br>***FY 2019 Base Plans:***<br>Remove ICMS, AASGS SCS and AASGS CT TEMPALTs. Complete transitions to COLUMBIA and VA Class programs. Install and test full-scale AMP propeller on Collins-Class submarine and conduct at-sea trials. Initiate follow-on project arrangement for destructive testing and analysis of full-scale propeller data. Continue to leverage products from Small Business and Independent Research and Development (IR&D) efforts and technology seedling efforts. Continue NGT design studies and plan small and/or large scale testing of technologies continue technology development (classified details) for insertion into VA Block VII. Continue industrialization and material assessment to transition advanced coatings technologies from ONR FNC effort. Final tile sizes and coverage for full scale demonstration will be defined to support FY19 OPALT package development for VA Class demonstration. Finalize the industrialization of the ONR advanced treatment, fabrication processes, and down select to a single material candidate to finalize development of a VA Class OPALT package. Execute US-UK submarine EM and acoustic trials at US range and conduct data analysis and begin TDP development for insertion of technology into VA Class Block VI and downstream VA trial. Initiate advanced signature management demonstrator development and begin TDP and test planning development. Complete transition of pump-jet technology to VA Class. Initiate development of the Advanced Control Effectors technology prototype for land based testing. Assess and study future technologies for future submarines and perform studies for improved platform capability and performance in support of the Tactical Submarine Evolution Plan (TSEP).<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>To account for project wide underexecution and funding reduction, several Long-Range R&D pillar projects received targeted reductions in investment, to include the Advanced Hull Treatments, Advanced Signature | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>2033 / *Adv Submarine Systems Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Management, and Advanced SSN Technology/TSEP projects. These budget cuts will be realized via near term reductions in project level of effort/scope and associated extensions of project timelines. | | | | | |
| ***Title:*** Rapid Technology Development and Submarine Integration | 10.996 | 6.350 | 4.357 | 0.000 | 4.357 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Conducts Navy and joint demonstrations of advanced technologies and payloads in order to assess the operational value of the technologies and systems under consideration to speed transition of operational capabilities. Focus is to develop, demonstrate, and transition technology projects in an 18 -30 month period. Transition successful, high-interest, high impact systems to the acquisition community. | | | | | |
| ***FY 2018 Plans:***<br>- Fabricate SAFECAP (fabrication of lithium ion vehicle kit, system level platform checkout testing, development of fully certified submarine integrated TEMPALT), achieve TEMPALT approval and plan at-sea testing of the final submarine SAFECAP hardware and TEMPALT package.<br>- Conduct testing of the common, communication architecture for UAS from a submarine or land-based test facility. Initiate transition to Combat Control System (PMS425), Submarine Imaging & Electronic Warfare (PMS435) program offices. Develop and provide antenna systems for operations (UAS Common Communications) to fleet. Demonstrate E2E capability at the end of FY18 or start of FY19 depending on test platform availability.<br>- Initiate development of long-range, deployable/retrievable instrumented ISR buoy. Initiate TEMPALT design and operational test plan development.<br>- Initiate development of approved Joint Concept Test Demonstration (JCTD) or Undersea Rapid Capability Initiatives (URCI)candidate project. Specific project concept will be developed through low-level demonstration testing. | | | | | |
| ***FY 2019 Base Plans:***<br>- Demonstrate the common communications, Unmanned Aerial System (UAS) operation if unperformed in FY18 Q4.<br>- Demonstrate the Lithium Ion SAFECAP FMAUV design in a capstone test. Transition the design into the LBS program of record in the Battlespace Awareness and Information's Operations Program Office (PMW 120).<br>- Continue development of approved Joint Concept Test Demonstration (JCTD)or URCI project. Initiate development of TDP and submarine TEMPALT for initial prototyping and demonstration. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>2033 / *Adv Submarine Systems Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Continue development of the long-range, deployable/retrievable instrumented ISR buoy. Complete TEMPALT development and operational test plan development. Target test of initial capability in FY20.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>The Rapid Technology Development and Submarine Integration decrease was largely accounted for in the planned technology transition of the UAS COMMs project to PMS435 and the deferral of follow-on rapid prototyping efforts. While the planned transfer of UAS COMMS project to PMS435 limited impacts to other ongoing projects, the budget decrease within this pillar significantly reduced the overall scope of Project 2033 prototyping. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 51.684 | 35.795 | 30.685 | 0.000 | 30.685 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Non-ACAT program with BA4 R&D investment. Projects transition via formal processes to acquisition programs of record for inclusion into existing ship baselines or initiation as new POR capabilities. Sole source Concept Formulation (CONFORM) contracts with the only two submarine design/construction shipyards, General Dynamics Electric Boat (GDEB) and Huntington Ingalls Industries (HII) facilitate this process. Use of topic-specific Broad Area Announcement (BAA) solicitations to advance submarine advanced technology work. Engagement with industry to build vendor base and support development of R&D products for enhanced submarine capability via competitively awarded Small Business
Innovation Research (SBIR) and Broad Agency Agreement (BAA) contracts to support advanced technology Hull Mechanical & Electrical (HM&E) and payload systems.

**E. Performance Metrics**

- Sustain critical one of a kind national Research and Development (R&D) hydroacoustic infrastructure enabling the design and assessment of VIRGINIA Class, COLUMBIA Class, and future submarine class designs.
- Deliver 2-3 Rapid Prototype projects annually to evaluating future submarine technology/payload concepts. Execute projects in established timelines and under cost cap. Target deliverables as tactical TEMPALTs.
- Assess as-built VIRGINIA and SSGN submarines for design drivers/design tools and model validation to define R&D needs for future submarine classes.
- Industrialize future submarine coatings to enable continued acoustic superiority of VA Class design and field as and advanced demonstrator.
- Successfully construct and deliver full-scale advanced material propeller for at-sea testing.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
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| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>2033 / *Adv Submarine Systems Development* |

- Develop summary report on modeling approaches and associated predicted performance in the area of hull sensors, threat environments, and situational awareness.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603561N / *Advanced Submarine System Development* | Project (Number/Name)<br>2033 / *Adv Submarine Systems Development* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Product Development | WR | NSWC Crane : Crane, IN | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | - |
| Product Development | WR | NSWC PHILLY : Philly, PA | 0.165 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Product Development | WR | NRL : Washington, DC | 2.318 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.318 | - |
| Product Development | SS/CPFF | SupShips : Groton, CT | 2.958 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.958 | - |
| Product Development | SS/CPFF | HII : Newport News, VA | 8.580 | 4.930 | Apr 2017 | 4.954 | Apr 2018 | 3.000 | Apr 2019 | - | | 3.000 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | EB : Groton, CT | 61.651 | 13.134 | Apr 2017 | 2.901 | Apr 2018 | 2.648 | Apr 2019 | - | | 2.648 | Continuing | Continuing | Continuing |
| Product Development | WR | NSWC : Carderock, MD | 89.213 | 5.705 | Apr 2017 | 5.750 | Apr 2018 | 5.000 | Apr 2019 | - | | 5.000 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | ARL/PSU : State College, PA | 8.428 | 0.575 | Apr 2017 | 0.580 | Apr 2018 | 0.585 | Apr 2019 | - | | 0.585 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | JHU/APL : Laurel, MD | 21.997 | 1.200 | Apr 2017 | 1.224 | Apr 2018 | 1.225 | Apr 2019 | - | | 1.225 | Continuing | Continuing | Continuing |
| Product Development | Various | Various : Various | 35.921 | 0.289 | Apr 2017 | 0.290 | Apr 2018 | 0.296 | Apr 2019 | - | | 0.296 | Continuing | Continuing | Continuing |
| Product Development | WR | NUWC : Newport, RI | 76.133 | 1.820 | Mar 2017 | 1.825 | Mar 2018 | 1.830 | Mar 2019 | - | | 1.830 | Continuing | Continuing | Continuing |
| Product Development | WR | ONR : Arlington, VA | 10.224 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | Progeny : Manassas VA | 0.695 | 0.000 | | 0.000 | | 0.000 | May 2019 | - | | 0.000 | 0.000 | 0.695 | - |
| | | **Subtotal** | 318.283 | 27.653 | | 17.524 | | 14.584 | | - | | 14.584 | Continuing | Continuing | N/A |

**Remarks**

Various/VAR is used to group multiple activities with small funding levels.
Activities will be incrementally funded. The award dates reflect the latest incremental portion funds will obligate.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>2033 / *Adv Submarine Systems Development* | |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Contractor Engineering Support | SS/CPFF | Various : Various | 13.617 | 1.339 | Jun 2017 | 1.340 | Jun 2018 | 1.350 | Mar 2019 | - | | 1.350 | Continuing | Continuing | Continuing |
| Government Engineering Support | WR | Various : Various | 6.863 | 0.350 | Mar 2017 | 0.357 | Mar 2018 | 0.364 | Mar 2019 | - | | 0.364 | Continuing | Continuing | Continuing |
| Travel | WR | NAVSEA HQ : Not Specified | 1.003 | 0.100 | Mar 2017 | 0.102 | Mar 2018 | 0.104 | Mar 2019 | - | | 0.104 | Continuing | Continuing | Continuing |
| Acquisition Workforce | Various | Not Specified : Not Specified | 0.293 | 0.000 | | 0.000 | | 0.000 | Nov 2018 | - | | 0.000 | 0.000 | 0.293 | 0.293 |
| | | **Subtotal** | 21.776 | 1.789 | | 1.799 | | 1.818 | | - | | 1.818 | Continuing | Continuing | N/A |

**Remarks**

Various/VAR is used to group multiple activities with small funding levels.
Activities will be incrementally funded. The award dates reflect the latest incremental portion funds will obligate.

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Developmental Test & Evaluation | SS/CPFF | EB : Groton, CT | 13.698 | 5.800 | May 2017 | 5.810 | May 2018 | 5.820 | May 2019 | - | | 5.820 | Continuing | Continuing | Continuing |
| Developmental Test & Evaluation | WR | NSWC/PHILLY : PHILLY, PA | 9.104 | 0.000 | | 0.000 | | 0.000 | Oct 2018 | - | | 0.000 | 0.000 | 9.104 | 9.104 |
| Developmental Test & Evaluation | Various | Various : Various | 7.387 | 0.670 | Apr 2017 | 0.675 | Apr 2018 | 0.675 | Apr 2019 | - | | 0.675 | 0.000 | 9.407 | 6.372 |
| Developmental Test & Evaluation | WR | NUWC : Newport, RI | 22.883 | 7.027 | Apr 2017 | 1.255 | Apr 2018 | 1.050 | Apr 2019 | - | | 1.050 | Continuing | Continuing | Continuing |
| Developmental Test & Evaluation | WR | NSWC : Carderock, MD | 43.892 | 6.745 | Apr 2017 | 6.732 | Apr 2018 | 6.738 | Apr 2019 | - | | 6.738 | Continuing | Continuing | Continuing |
| Developmental Test & Evaluation | SS/CPFF | HII : Newport News, VA | 5.794 | 0.000 | | 0.000 | | 0.000 | Oct 2018 | - | | 0.000 | Continuing | Continuing | Continuing |
| Developmental Test & Evaluation | SS/CPFF | JHU/ARL : Laurel, MD | 3.805 | 2.000 | Apr 2017 | 2.000 | Apr 2018 | 0.000 | Apr 2019 | - | | 0.000 | 0.000 | 7.805 | 0.305 |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603561N / *Advanced Submarine System Development* | Project (Number/Name)<br>2033 / *Adv Submarine Systems Development* | |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Developmental Test & Evaluation | SS/CPFF | ARL/PSU : State College, PA | 0.845 | 0.000 | | 0.000 | | 0.000 | Oct 2018 | - | | 0.000 | 0.000 | 0.845 | 0.720 |
| | | **Subtotal** | 107.408 | 22.242 | | 16.472 | | 14.283 | | - | | 14.283 | Continuing | Continuing | N/A |

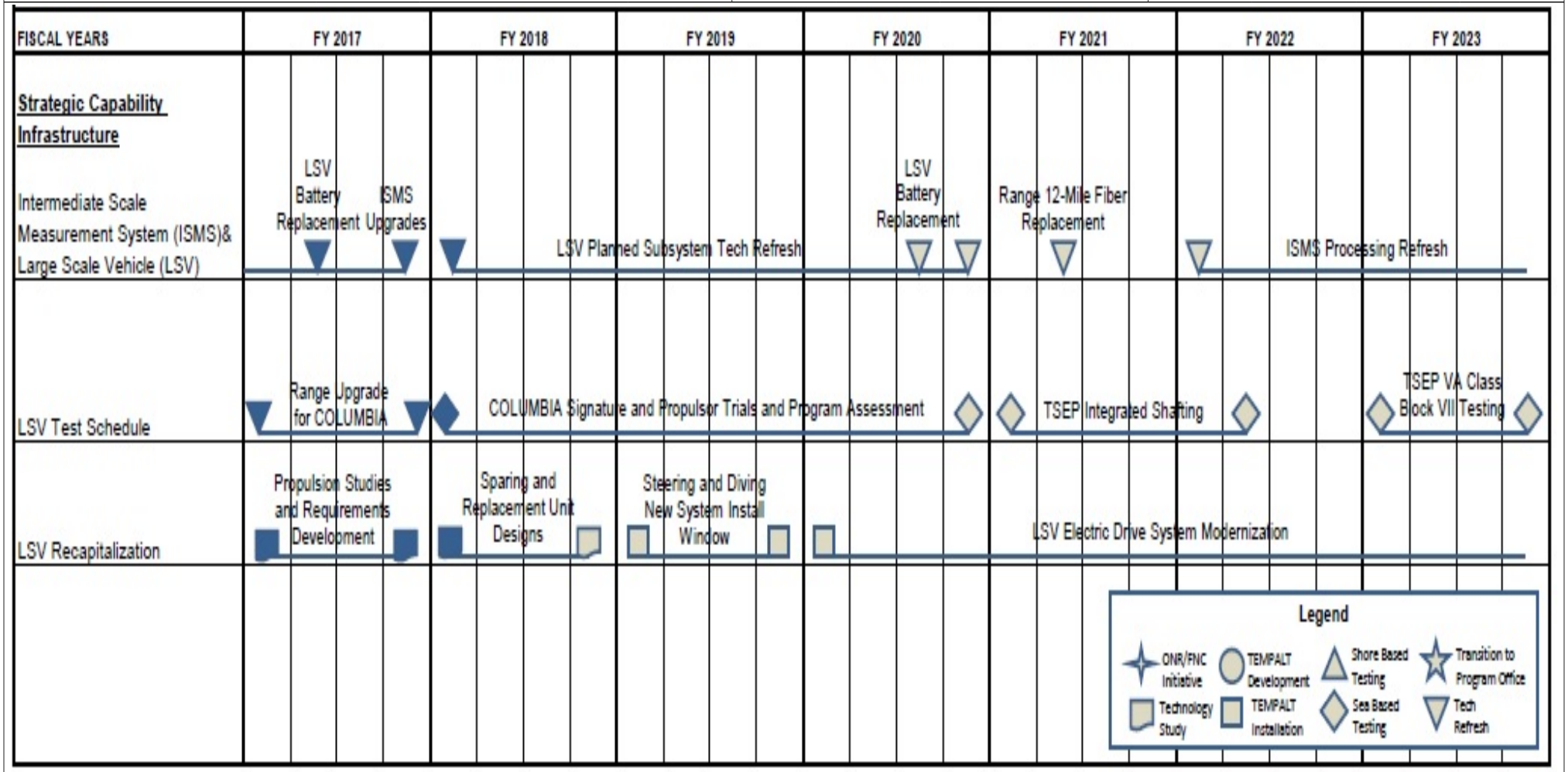
**Remarks**

Various/VAR is used to group multiple activities with small funding levels.
Activities will be incrementally funded. The award dates reflect the latest incremental portion funds will obligate.

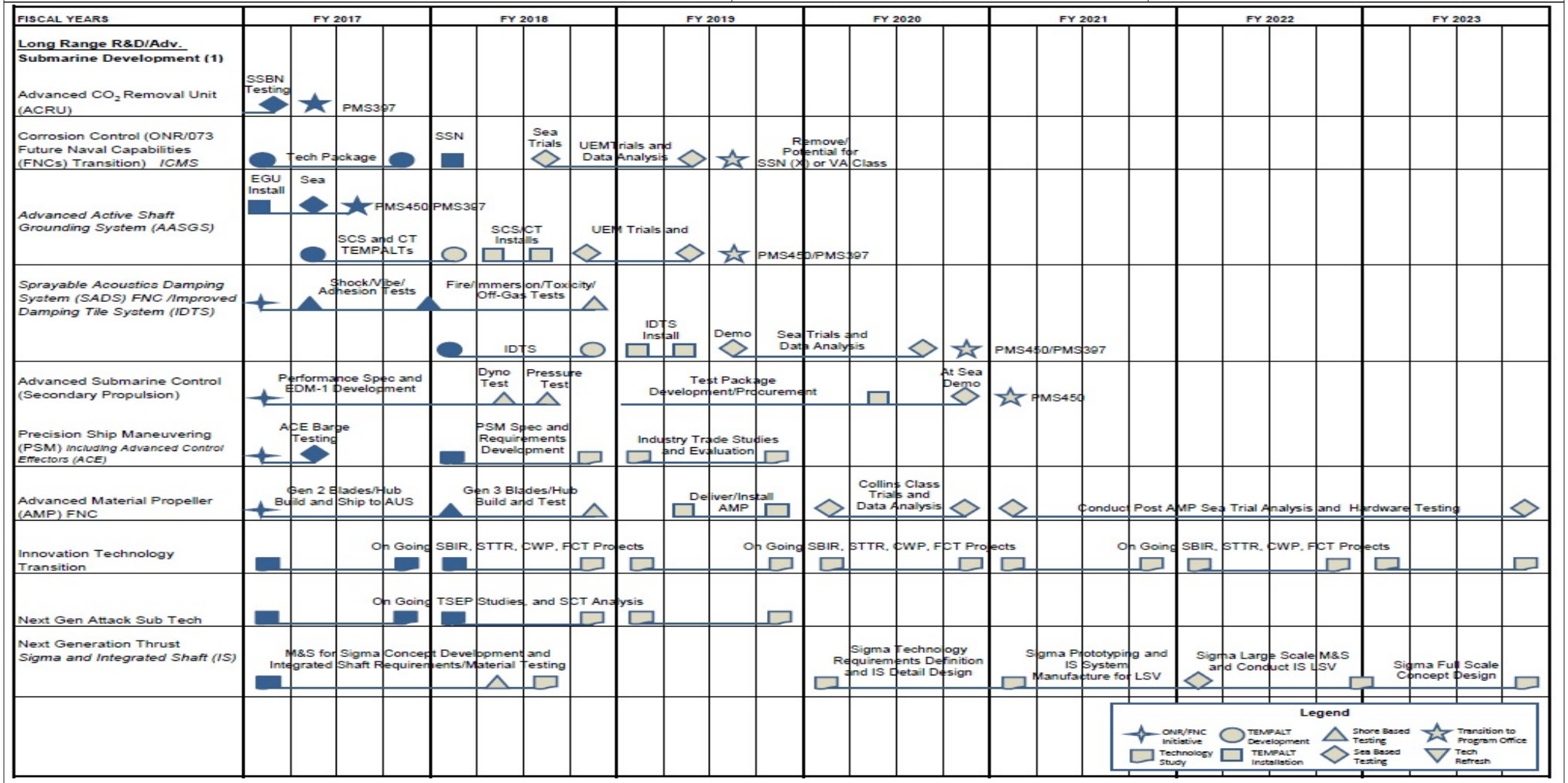
| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 447.467 | 51.684 | | 35.795 | | 30.685 | | - | | 30.685 | Continuing | Continuing | N/A |

**Remarks**

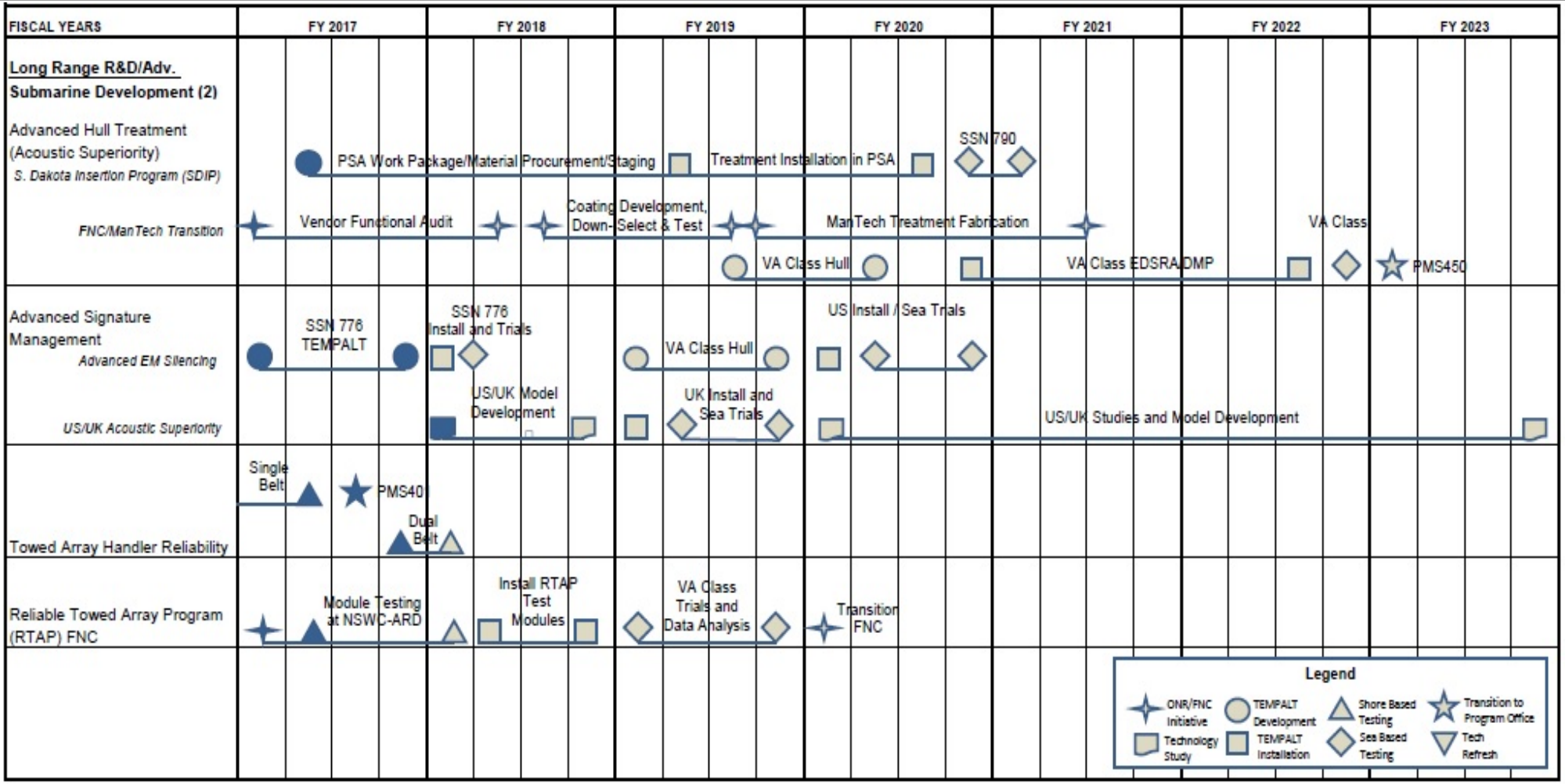
| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>2033 / *Adv Submarine Systems Development* |



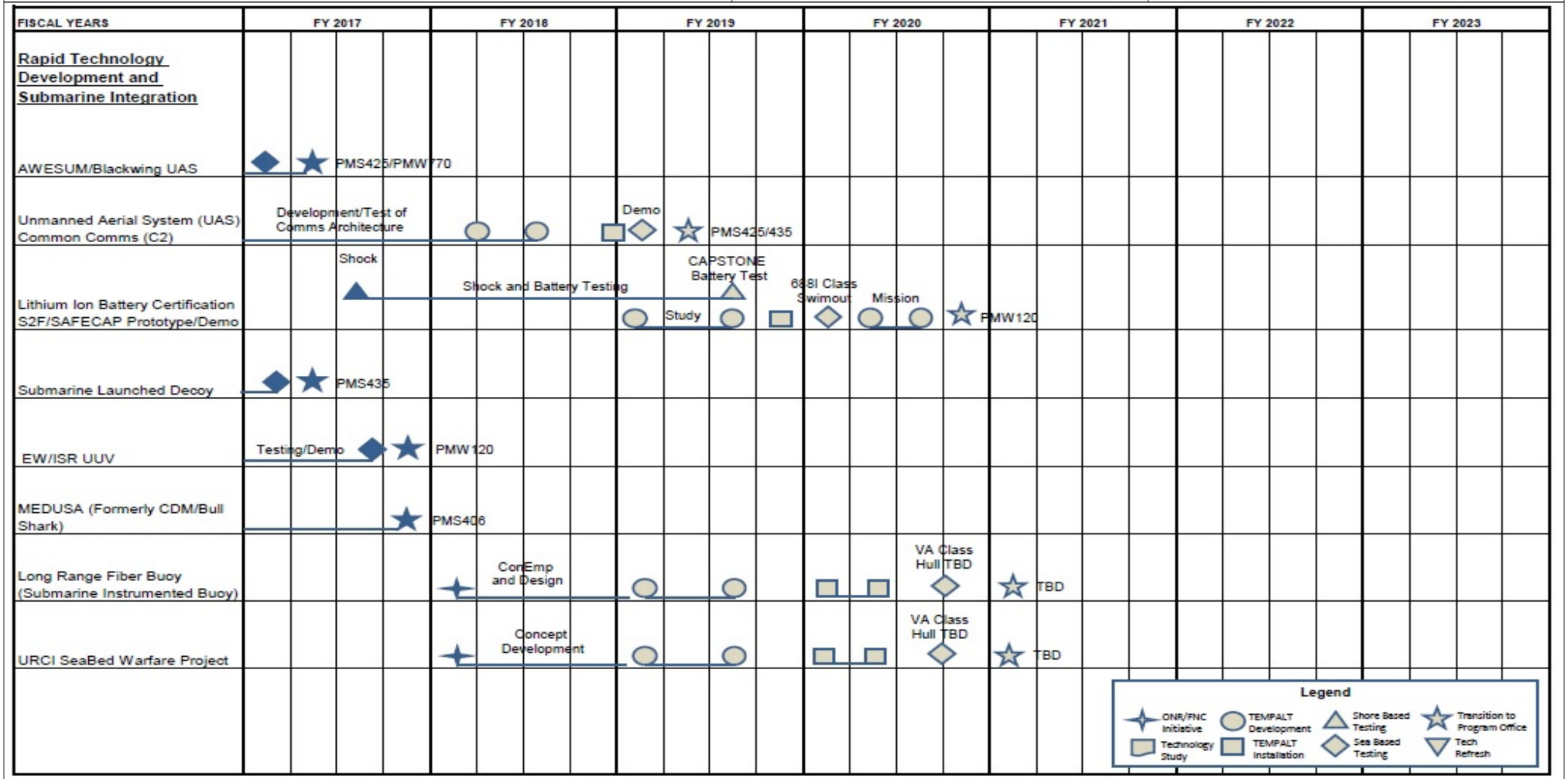
| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>2033 / *Adv Submarine Systems Development* |



| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>2033 / *Adv Submarine Systems Development* |



| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>2033 / *Adv Submarine Systems Development* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>2033 / *Adv Submarine Systems Development* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 2033*** | | | | |
| Strategic Capability Infrastructure: ISMS/LSV - ISMS Upgrades | 1 | 2017 | 4 | 2017 |
| Strategic Capability Infrastructure: ISMS/LSV - LSV Planned Subsystem Tech Refresh | 1 | 2018 | 4 | 2020 |
| Strategic Capability Infrastructure: ISMS/LSV - Range fiberoptic replacement | 2 | 2021 | 2 | 2021 |
| Strategic Capability Infrastructure: ISMS/LSV - ISMS Tech Refresh | 1 | 2022 | 4 | 2022 |
| Strategic Capability Infrastructure: ISMS /LSV - Sustainment, Maintenance,Crew Qualification and Operations | 1 | 2017 | 4 | 2022 |
| Strategic Capability Infrastructure: ISMS /LSV - Battery Replacement (BR) | 3 | 2017 | 3 | 2017 |
| Strategic Capability Infrastructure: ISMS /LSV - BR | 3 | 2020 | 3 | 2020 |
| Strategic Capability Infrastructure: LSV Test Schedule - Range Upgrade for LSV | 1 | 2017 | 4 | 2017 |
| Strategic Capability Infrastructure: LSV Test Schedule - Propeller Testing | 1 | 2018 | 1 | 2019 |
| Strategic Capability Infrastructure: LSV Test Schedule - ONR/ORP Test | 2 | 2019 | 4 | 2021 |
| Strategic Capability Infrastructure: LSV Recapitalization - Installation and Testing Window | 1 | 2022 | 4 | 2022 |
| Long Range R&D/Advanced Submarine Development: Advanced CO2 Removal Unit (ACRU) - Remove SSBN Shipboard Test Cube | 1 | 2017 | 1 | 2017 |
| Long Range R&D/Advanced Submarine Development: Corrosion Control - ICMS - Install ICMS TEMPALT. Complete Pierside and EM trials planning | 1 | 2017 | 4 | 2017 |
| Long Range R&D/Advanced Submarine Development: Corrosion Control - ICMS - Perform pierside testing and EM Trial TEMPALT | 1 | 2018 | 4 | 2018 |
| Long Range R&D/Advanced Submarine Development: Corrosion Control - AASGS - Monitor EGU TEMPALT at-sea. Install SCS and CT TEMPALTs. Complete SCS and CT Pierside and EM trial TEMPALT planning | 1 | 2017 | 4 | 2017 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>2033 / *Adv Submarine Systems Development* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Long Range R&D/Advanced Submarine Development: Corrosion Control - AASGS - Remove EGU TEMPALT. Perform pierside and EM trial, SCS and CT TEMPALT testing | 1 | 2018 | 4 | 2018 |
| Long Range R&D/Advanced Submarine Development: Corrosion Control - AASGS - Remove TEMPALTS and analyze data | 1 | 2019 | 4 | 2019 |
| Long Range R&D/Advanced Submarine Development: Advanced Submarine Control - (ASC) - Develop CONOPS and performance specification and testing. Initiate Shipboard Integration | 1 | 2017 | 4 | 2017 |
| Long Range R&D/Advanced Submarine Development: Advanced Material Propeller - US and Australia Collaborative Project | 1 | 2017 | 4 | 2022 |
| Long Range R&D/Advanced Submarine Development: Advanced Material Propeller - Manufacture and test Gen 3 blades and hub | 1 | 2017 | 4 | 2017 |
| Long Range R&D/Advanced Submarine Development: Advanced Material Propeller (AMP) - Deliver AMP to Australia and test at-sea, study multi-material | 1 | 2018 | 4 | 2018 |
| Long Range R&D/Advanced Submarine Development: Advanced Material Propeller (AMP) - Assess roto blade at-sea, continue study of multi-material | 1 | 2019 | 4 | 2019 |
| Long Range R&D/Advanced Submarine Development: Advanced Material Propeller (AMP) - Demo roto blade at-sea, continue study of multi-material | 1 | 2020 | 4 | 2020 |
| Long Range R&D/Advanced Submarine Development: Advanced Material Propeller (AMP) - Build 2nd LSV multi-material rotor, design full scale rotor | 1 | 2021 | 4 | 2021 |
| Long Range R&D/Advanced Submarine Development: Advanced Material Propeller (AMP) - Demo 2nd LSV rotor full-scale multi-material rotor | 1 | 2022 | 4 | 2022 |
| Long Range R&D/Advanced Submarine Development: Innovation Technolology Transition (SBIR transition) - New Design Concept Dev.,/Sys. improvement. Transition SBIR and IRAD projects | 1 | 2017 | 4 | 2022 |
| Long Range R&D/Advanced Submarine Development: SSN(X) - Roadmapping technology developnent for the next submarine class | 1 | 2017 | 4 | 2022 |
| Long Range R&D/Advanced Submarine Development: Next Generation Thrust (NGT) | 1 | 2017 | 4 | 2022 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>2033 / *Adv Submarine Systems Development* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Long Range R&D/Advanced Submarine Development: Electromagnetic Signatures Project Arrangement with UK & Advanced Signature Management FNC | 1 | 2017 | 4 | 2022 |
| Long Range R&D/Advanced Submarine Development: Advanced Hull Coatings - Joint US/UK Coatings Development and Modeling | 1 | 2017 | 4 | 2017 |
| Long Range R&D/Advanced Submarine Development: Advanced Hull Coatings - Transition ONR Future Naval Capability (FNC) Hull Coatings | 1 | 2017 | 4 | 2022 |
| Long Range R&D/Advanced Submarine Development: Advanced Hull Coatings - Develp OPALT Treatment pkg and begin Long Lead Procurement | 2 | 2017 | 2 | 2017 |
| Long Range R&D/Advanced Submarine Development: Advanced Hull Coatings - Finalize Requirements and Treatment Configuration | 3 | 2017 | 2 | 2018 |
| Long Range R&D/Advanced Submarine Development: Advanced Hull Coatings - Treatment Installation, conduct at-sea test on VA Class Submarine | 3 | 2018 | 4 | 2019 |
| Long Range R&D/Advanced Submarine Development: Advanced Hull Coatings - Data Analysis | 1 | 2020 | 4 | 2022 |
| Long Range R&D/Advanced Submarine Development: Towed Array Reliability Improvement FNC - Conduct at-sea testing and update software tools | 1 | 2017 | 4 | 2017 |
| Long Range R&D/Advanced Submarine Development: Towed Array Reliability Improvement FNC - Develop and validate software Tools for Predicting Array Operational Loading & Distribution (FNC) | 1 | 2017 | 4 | 2017 |
| Long Range R&D/Advanced Submarine Development: Advanced Signature Management FNC | 1 | 2019 | 1 | 2022 |
| Long Range R&D/Advanced Submarine Development: Longe Range FIber Buoy | 1 | 2017 | 4 | 2019 |
| Long Range R&D/Advanced Submarine Development: SSN/SSGN (S3P) - Address gaps in stealth and survivability for SSN and SSGNs | 1 | 2017 | 4 | 2017 |
| Long Range R&D/Advanced Submarine Development: Operational Survivability Assessment - Annual assessment of states of S3P with respect to adversary capability and available science | 1 | 2017 | 4 | 2017 |
| Long Range R&D/Advanced Submarine Development: Operational Survivability - Assessment of SSN/SSGN acoustic health as requested by the SOG | 1 | 2017 | 4 | 2017 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>2033 / *Adv Submarine Systems Development* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Long Range R&D/Advanced Submarine Development: Non-Acoustic Assessment - Assessment of SSN/SSGN non-acoustic health as requested by the SOG | 1 | 2017 | 4 | 2017 |
| Long Range R&D/Advanced Submarine Development: SAS Sea Testing - Sub vs. Sub Sea Testing | 1 | 2017 | 4 | 2017 |
| Long Range R&D/Advanced Submarine Development: Communication - Model, Test and Analysis | 1 | 2017 | 4 | 2017 |
| Long Range R&D/Advanced Submarine Development: Fixed Arrays - Sea Test and Analysis | 1 | 2017 | 4 | 2017 |
| Long Range R&D/Advanced Submarine Development: Sea Test Validation Program - Sea Test and Analysis | 1 | 2017 | 4 | 2017 |
| Long Range R&D/Advanced Submarine Development: PELAGOS - Commence Project to Program of Record, Initiate VA Tactical version/configuration | 1 | 2017 | 4 | 2017 |
| Long Range R&D/Advanced Submarine Development: Submarine Acoustic Superiority (SAS) - Utility Analysis | 1 | 2017 | 4 | 2017 |
| Long Range R&D/Advanced Submarine Development: Countermeasure #1 Development - Update Algorithms | 1 | 2017 | 4 | 2017 |
| Rapid Technology Development and Submarine Integration: AWESUM JCTD - Collaboration on Unmanned Aerial System (UAS) with UK/AUS/Future payload integration | 1 | 2017 | 4 | 2022 |
| Rapid Technology Development and Submarine Integration: Lithium Ion Battery Certification -Complete testing, certification approval, fabrication, TEMPALT TDP | 1 | 2017 | 4 | 2017 |
| Rapid Technology Development and Submarine Integration: Lithium Ion Battery Certification - Approve TEMPALT, conduct at-sea demo. Transition to Battlespace Awareness and Information Operations | 1 | 2018 | 4 | 2018 |
| Rapid Technology Development and Submarine Integration: Submarine Launch Decoy - Mature configuration and conduct At-Sea Test | 1 | 2017 | 4 | 2017 |
| Rapid Technology Development and Submarine Integration: EW/ISR UUV - Demo an autonomous mission capability for EW/ISR | 1 | 2017 | 4 | 2017 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>2033 / *Adv Submarine Systems Development* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Rapid Technology Development and Submarine Integration: Common Unmanned Aerial System (UAS) Coms | 1 | 2017 | 4 | 2018 |
| Rapid Technology Development and Submarine Integration: Clanedestine Delivered Mine (CDM) - Develop, integrate and test CDM | 1 | 2017 | 1 | 2019 |
| Rapid Technology Development and Submarine Integration: Payload Integration - Innovative Payload Concepts | 1 | 2017 | 4 | 2022 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603561N / *Advanced Submarine System Development* | Project (Number/Name)<br>2096 / *Payload Delivery Development* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2096: *Payload Delivery Development* | 0.000 | 3.800 | 15.738 | 22.956 | - | 22.956 | 22.887 | 12.659 | 10.188 | 14.012 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Payload Delivery Development is a non-acquisition program that supports innovative research and development efforts to enable integration of deployable and/or retrievable undersea vehicles, payload concepts, and offboard systems through design, manufacture, test/demonstration, evaluation, and validation for submarine platforms. In addition to technology development, the program will support engineering and integration of new and existing technologies to enable rapid prototyping and fielding of capabilities which will inform and provide solutions to urgent war-fighter needs. Experimentation will be conducted with the Fleet (i.e., Commander, Naval Submarine Forces (COMSUBFOR), Unmanned Undersea Vehicle Squadron One (UUVRON ONE), etc.), enabling an agile environment through at-sea demonstrations, which will provide Fleet and acquisition stakeholders with relevant payload employment data to inform Concepts of Operations (CONOPs) and fielding decisions. The program will furthermore support transition of high-interest systems and/or payloads from research and development to Programs of Record (PoRs), as appropriate.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Payload Handling System (PHS) | 3.800 | 9.038 | 17.869 | 0.000 | 17.869 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** PHS is used to enable the integration of large deployable and retrievable undersea vehicles, payloads, and offboard systems with large diameter vertical tubes primarily on guided missile (SSGN) and subsequently VIRGINIA class Block V and future submarines. PHS will initially be installed on an SSGN platform to establish proof of concept and demonstrate vertical stowage, launch and recovery capability, and integration for operational employment to influence VIRGINIA Payload Module design. Subsequent PHS application on VIRGINIA Class Block V and future submarines will support fully integrated vertical stowage, launch and recovery capability as a Fleet asset, and operational employment.<br><br>PHS funding will be used to design, manufacture, and field an integrated system to enable vertical stowage, launch and recovery of systems such as the U.S. Navy's Unmanned Undersea Vehicles (UUVs) Family of Systems (FoS) from submarines, a capability which does not currently exist. The PHS will allow the Submarine Force the flexibility to launch and recover advanced systems of various configurations, including the U.S. Navy's UUVs FoSs, in support of critical Undersea Warfare (USW) missions, providing persistent presence and payload capacity. Launch and recovery of the U.S. Navy's UUVs FoSs from submarines will provide critical battle space awareness and extend war-fighting reach as a force multiplier complementary to the fast attack | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>2096 / *Payload Delivery Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| submarine (SSN) fleet. This capability is paramount to countering evolving threats from emerging world powers and maintaining dominance in the undersea domain.<br><br>***FY 2018 Plans:***<br>Continue NRE to support completion of PDR and transition into critical design of the PHS. Post-PDR plans include transition into a critical design phase, culminating in a critical design review (CDR) planned for late FY19. Approval of design maturity at CDR will support manufacturing, testing, and installation of a PHS onboard an SSGN from FY20 through FY23. Additionally, engineering support for VIRGINIA Class Block V submarine payload integration will allow the establishment of a complete, inclusive technical baseline for the VIRGINIA Payload Module (VPM) that accommodates future payloads and eliminates risk associated with costly and lengthy alterations that would be required to enable hosting of payloads.<br><br>Specific FY18 tasks required for critical design are as follows:<br>- Payload Handling Element Material Friction Test<br>- Completion of PDR<br>- Commence Critical Design<br>- Payload Handling Element Detailed Design<br>- Hydraulic System Detailed Design<br>- Electrical and Control System Detailed Design<br>- System Schematic and Diagram update based on detailed design<br>- System Arrangement based on detailed design<br>- Detailed Structural Analysis<br>- Detailed Hydrodynamic Load Case Modeling/Analysis<br>- Detailed Shock Modeling/Analysis<br>- Interface Control Documentation<br>- Component Specification Development<br>- Long Lead Material Identification<br>- Manufacturing Cost Estimate Development<br>- Build Strategy Development<br>- Operating Procedure Development<br>- Hazard Assessment Development | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>2096 / *Payload Delivery Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Failure Modes and Effects Analysis<br>***FY 2019 Base Plans:***<br>Continue NRE to support completion of CDR, complete specification development, and execute long lead time material procurements to support transition into manufacturing and testing of the PHS. Approval of design maturity at CDR will support manufacturing, testing, and installation of a PHS onboard an SSGN from FY20 through FY23.<br><br>Specific FY19 tasks required for critical design are as follows:<br>- Payload Handling Element Detailed Design<br>- Hydraulic System Detailed Design<br>- Electrical and Control System Detailed Design<br>- System Schematic and Diagram update based on Detailed Design<br>- System Arrangement based on Detailed Design<br>- Detailed Structural Analysis<br>- Detailed Hydrodynamic Load Case Modeling/Analysis<br>- Detailed Shock Modeling/Analysis<br>- Interface Control Documentation<br>- Component Specification Development<br>- Long Lead Material Identification<br>- Long Lead Material Procurement<br>- Manufacturing Cost Estimate Development<br>- Build Strategy Development<br>- Operating Procedure Development<br>- Hazard Assessment Development<br>- Failure Modes and Effects Analysis<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Program growth from FY18 to FY19 is required for Long Lead Time Material (LLTM) procurement in order to maintain schedule for installation and testing onboard an SSGN. Additional program growth includes component prototype development and testing, and design and engineering team support. LLTM purchases must be | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>2096 / *Payload Delivery Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| executed in FY19 to support FY20 construction start. Project requires engineering support to facilitate payload integration design efforts on SSGNs and facilitate forward compatibility with VIRGINIA Class Block V submarines with the Virginia Payload Module (VPM). The nominal level of design and integration tasking planned for FY18 will be increased in FY19 to support development of design products which will comprise the technical package for critical design review (CDR) in FY20. | | | | | |
| ***Title:*** 3 Inch Submarine Launched Unmanned Aerial System | 0.000 | 6.700 | 5.087 | 0.000 | 5.087 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** The 3" Submarine Launched Unmanned "K" Aerial System (SL-UKAS) project supports the future missions of the VIRGINIA Class Program and its payload module. The project will focus on the overall design, system engineering, prototyping, demonstrations, and qualification activities needed to execute the integration of a "K" payload with a 3" UAS vehicle for rapid deployment with an integrated solution into existing shipboard systems. This system will be demonstrated at a land based facility and at sea by the end of FY20. Capability will transition to the Submarine Combat Control System Program Office (PMS 425) in FY20.<br><br>The following key activities of the 3" SL-UKAS project support a critical capability for USW missions by providing close-in defense for the Submarine Force against adversary systems:<br><br>1. Engineering and integration of existing/proven technology and payloads required to provide a much needed capability to maintain dominance in the undersea domain and extend the operational reach of the Submarine Fleet.<br>2. Testing and demonstrations necessary to prove out the capability and define CONOPs.<br>3. Development/testing "safe arm mechanism" to safely stow proposed equipment types onboard submarines.<br><br>***FY 2018 Plans:***<br>Initiate rapid prototyping and system engineering efforts required for integration of a "K" payload with an existing 3" UAS vehicle design (including review and modification of system requirements, communications, interface and drawings for payload equipment, and system and subsystem detailed design).<br><br>Start/Complete the following Preliminary Design efforts:<br>- Complete prototype contract via Other Transaction Agreement (OTA)<br>- Define system requirements to modify the existing unmanned aerial vehicle(s) and canister with the new payload to minimize major design changes and ensure system safety | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>2096 / *Payload Delivery Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Design modifications to change the initial UAS vehicle to a more modular design which will increase reliability of the vehicle and streamline production manufacturing<br>- Initial payload determination and testing to ensure the payload will accomplish the current Undersea Warfare (USW) mission requirements by providing close-in defense and over-the horizon targeting which will extend the operational reach of our submarine force<br>- Completion of Preliminary Design Review (PDR) and transition into Detailed Design with down selection of competing vehicle designs.<br>***FY 2019 Base Plans:***<br>Continue rapid prototyping and system engineering efforts required for integration of a "K" payload with an existing 3" UAS vehicle design (including review and modification of system requirements, communications, interface and drawings for payload equipment, and system and subsystem detailed design).<br><br>Start/Complete the following Vehicle Integration and Testing efforts:<br>- Complete Detailed Design and Critical Design Review (CDR)<br>- Long Lead Time Identification and Procurement of material.<br>- Manufacture Prototype of vehicle, canister, and "K" payload<br>- Conduct Test Readiness Review (TRR)<br>- Initiate integration testing of the vehicle, canister, and "K" payload (i.e., Vehicle Dynamics, Payload Precision, Accuracy/Targeting, WSESRB, Shock, IA, etc.)<br>- Initiate demonstration preparations in order to successfully demonstrate the UKAS vehicle with the integrated payload in FY20 (UAS test systems material procurement and builds, development of special test fixtures, and demonstration requirements)<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Decrease from FY18 to FY19 is in accordance with planned program profile and is not due to a negative action against this effort. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 3.800 | 15.738 | 22.956 | 0.000 | 22.956 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>2096 / *Payload Delivery Development* |

**C. Other Program Funding Summary ($ in Millions)**

**Remarks**

**D. Acquisition Strategy**

Payload Delivery Development is a non-acquisition program that leverages government laboratories, field activities, and industry to enable research and development efforts in support of technology and system development, manufacture, testing, integration and fielding on submarine host platforms. Engage with industry and utilize various contracts (i.e., Other Transaction Agreements (OTAs), sole-source, competitive) from broad solicitations as necessary to facilitate requirements, development, and production support to allow rapid integration of payloads and offboard systems. Technology solutions will transition to appropriate Acquisition Category (ACAT) Program Management Offices (PMOs).

**E. Performance Metrics**

Payload Handling System (PHS)
Completion of Preliminary Design Review (PDR). Commencement of Critical Design.

3" Sub Launched Unmanned "K" Aerial System (SL-UKAS)
Updated Master Schedule and down-select payload to final design. Development of design documentation and interface control requirements. Completion of Detailed Design Review.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603561N / *Advanced Submarine System Development* | Project (Number/Name)<br>2096 / *Payload Delivery Development* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Product Development | WR | NUWC NPT : Newport, RI | 0.000 | 0.265 | May 2017 | 1.174 | Oct 2017 | 1.250 | Oct 2018 | - | | 1.250 | Continuing | Continuing | Continuing |
| Product Development | WR | NSWC PD : Philadelphia, PA | 0.000 | 0.904 | May 2017 | 3.275 | Oct 2017 | 6.550 | Oct 2018 | - | | 6.550 | Continuing | Continuing | Continuing |
| Product Development | WR | NUWC KPT : Keyport, WA | 0.000 | 1.110 | May 2017 | 3.325 | Oct 2017 | 5.645 | Oct 2018 | - | | 5.645 | Continuing | Continuing | Continuing |
| Product Development | WR | PSNS : Bremerton, WA | 0.000 | 0.261 | May 2017 | 1.010 | Oct 2017 | 3.950 | Oct 2018 | - | | 3.950 | Continuing | Continuing | Continuing |
| Product Development | WR | NSWC CD : West Bethesda, MD | 0.000 | 0.300 | May 2017 | 0.910 | Oct 2017 | 1.000 | Oct 2018 | - | | 1.000 | Continuing | Continuing | Continuing |
| Product Development | WR | NRL : Washington, DC | 0.000 | 0.100 | Jul 2017 | 0.200 | Oct 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Product Development | WR | NSWC DD : Dahlgren, VA | 0.000 | 0.005 | Jul 2017 | 0.021 | Oct 2017 | 0.025 | Oct 2018 | - | | 0.025 | Continuing | Continuing | Continuing |
| Product Development | WR | PNS : Portsmouth, NH | 0.000 | 0.527 | Dec 2017 | 0.649 | Oct 2017 | 1.000 | Oct 2018 | - | | 1.000 | Continuing | Continuing | Continuing |
| Product Development | C/CPFF | AeroVironment : Simi Valley, CA | 0.000 | 0.000 | | 4.753 | Dec 2017 | 2.599 | Dec 2018 | - | | 2.599 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 3.472 | | 15.317 | | 22.019 | | - | | 22.019 | Continuing | Continuing | N/A |

**Management Services ($ in Millions)**

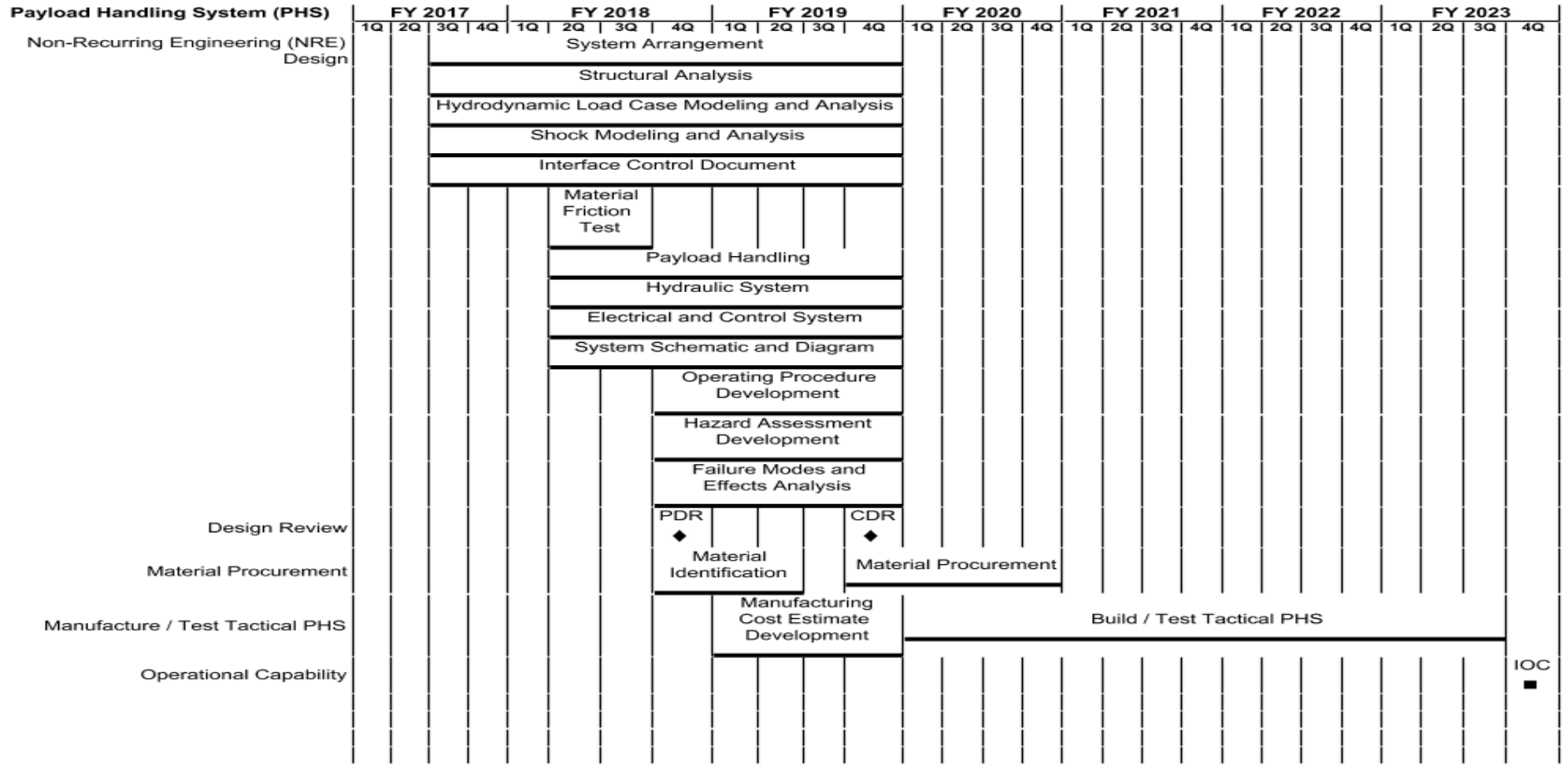
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Travel | Allot | NAVSEA HQ : Washington DC | 0.000 | 0.050 | May 2017 | 0.121 | Oct 2017 | 0.122 | Oct 2018 | - | | 0.122 | Continuing | Continuing | Continuing |
| Contractor Management Services | C/CPAF | NTT Data : McLean, VA | 0.000 | 0.278 | Aug 2017 | 0.300 | Dec 2017 | 0.815 | Dec 2018 | - | | 0.815 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.328 | | 0.421 | | 0.937 | | - | | 0.937 | Continuing | Continuing | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603561N / *Advanced Submarine System Development* | Project (Number/Name)<br>2096 / *Payload Delivery Development* | |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 3.800 | | 15.738 | | 22.956 | | - | | 22.956 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>2096 / *Payload Delivery Development* |

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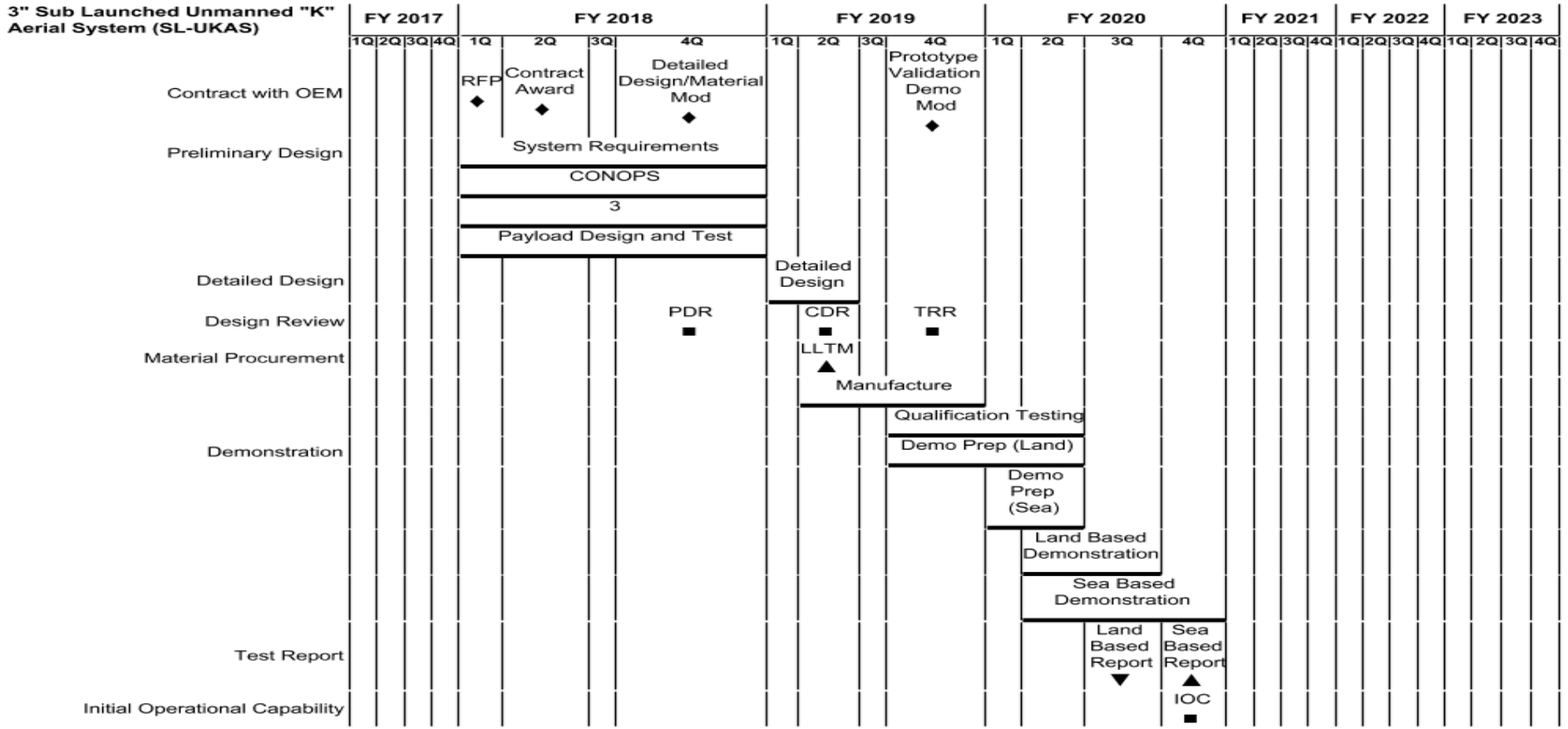
| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>2096 / *Payload Delivery Development* |




*2019PB - 0603561N - 2096*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>2096 / *Payload Delivery Development* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Payload Handling System (PHS)*** | | | | |
| Non-Recurring Engineering (NRE) Design: System Arrangement Development | 3 | 2017 | 4 | 2019 |
| Non-Recurring Engineering (NRE) Design: Structural Analysis | 3 | 2017 | 4 | 2019 |
| Non-Recurring Engineering (NRE) Design: Hydrodynamic Load Case Modeling and Analysis | 3 | 2017 | 4 | 2019 |
| Non-Recurring Engineering (NRE) Design: Shock Modeling and Analysis | 3 | 2017 | 4 | 2019 |
| Non-Recurring Engineering (NRE) Design: Interface Control Document | 3 | 2017 | 4 | 2019 |
| Non-Recurring Engineering (NRE) Design: Payload Handling Element Material Friction Test | 2 | 2018 | 3 | 2018 |
| Non-Recurring Engineering (NRE) Design: Payload Handling Element Design Development | 2 | 2018 | 4 | 2019 |
| Non-Recurring Engineering (NRE) Design: Hydraulic System Design Development | 2 | 2018 | 4 | 2019 |
| Non-Recurring Engineering (NRE) Design: Electrical and Control System Design Development | 2 | 2018 | 4 | 2019 |
| Non-Recurring Engineering (NRE) Design: System Schematic and Diagram Development | 2 | 2018 | 4 | 2019 |
| Non-Recurring Engineering (NRE) Design: Operating Procedure Development | 4 | 2018 | 4 | 2019 |
| Non-Recurring Engineering (NRE) Design: Hazard Assessment Development | 4 | 2018 | 4 | 2019 |
| Non-Recurring Engineering (NRE) Design: Failure Modes and Effects Analysis | 4 | 2018 | 4 | 2019 |
| Design Review: Preliminary Design Review | 4 | 2018 | 4 | 2018 |
| Design Review: Critical Design Review | 4 | 2019 | 4 | 2019 |
| Material Procurement: Material Identification | 4 | 2018 | 2 | 2019 |
| Material Procurement: Material Procurement | 4 | 2019 | 4 | 2020 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>2096 / *Payload Delivery Development* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Manufacture / Test Tactical PHS: Manufacturing Cost Estimate Development | 1 | 2019 | 4 | 2019 |
| Manufacture / Test Tactical PHS: Manufacture / Test Tactical PHS | 1 | 2020 | 3 | 2023 |
| Operational Capability: Inital Operational Capability | 4 | 2023 | 4 | 2023 |
| ***3" Sub Launched Unmanned "K" Aerial System (SL-UKAS)*** | | | | |
| Contract with OEM: Request for Proposal | 1 | 2018 | 1 | 2018 |
| Contract with OEM: Contract Award | 2 | 2018 | 2 | 2018 |
| Contract with OEM: Detailed Design/Material | 4 | 2018 | 4 | 2018 |
| Contract with OEM: Prototype Validation Demonstration(s) | 4 | 2019 | 4 | 2019 |
| Preliminary Design: System Requirements/Interfaces | 1 | 2018 | 4 | 2018 |
| Preliminary Design: CONOPS | 1 | 2018 | 4 | 2018 |
| Preliminary Design: 3" Vehicle and Canister Modification(s) | 1 | 2018 | 4 | 2018 |
| Preliminary Design: Payload Design and Test | 1 | 2018 | 4 | 2018 |
| Detailed Design: Detailed Design | 1 | 2019 | 2 | 2019 |
| Design Review: Preliminary Design Review | 4 | 2018 | 4 | 2018 |
| Design Review: Critical Design Review | 2 | 2019 | 2 | 2019 |
| Design Review: Test Readiness Review | 4 | 2019 | 4 | 2019 |
| Material Procurement: Long Lead Time Material Identification | 2 | 2019 | 2 | 2019 |
| Material Procurement: Manufacture | 2 | 2019 | 4 | 2019 |
| Material Procurement: Qualification Testing | 4 | 2019 | 2 | 2020 |
| Demonstration: Demonstration Preperation (Land Based) | 4 | 2019 | 2 | 2020 |
| Demonstration: Demonstration Preperation (Sea Based) | 1 | 2020 | 2 | 2020 |
| Demonstration: Land Based Demonstration | 2 | 2020 | 3 | 2020 |
| Demonstration: Sea Based Demonstration | 2 | 2020 | 4 | 2020 |
| Test Report: Land Based Report | 3 | 2020 | 3 | 2020 |
| Test Report: Sea Based Report | 4 | 2020 | 4 | 2020 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>2096 / *Payload Delivery Development* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Initial Operational Capability: Initial Operational Capability | 4 | 2020 | 4 | 2020 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603561N / *Advanced Submarine System Development* | Project (Number/Name)<br>3391 / *SSN/SSGN Survivability Program* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3391: *SSN/SSGN Survivability Program* | 0.000 | 0.000 | 8.594 | 8.327 | - | 8.327 | 8.453 | 8.600 | 8.767 | 8.954 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Project 3391 SSN/SSGN Survivability Program (S3P): Project realigned in FY18. S3P previously funded under Project 2033 through FY17. The S3P is chartered by OPNAV N97 to assure SSN/SSGN survivability and the ability of submarines to complete their missions even if covert mobility is compromised.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** SSN/SSGN Survivability Program | 0.000 | 8.594 | 8.327 | 0.000 | 8.327 |
| ***Articles:*** | - | - | - | - | - |

***Description:*** The details of project activities are SECRET or higher. The SSN/SSGN Survivability Program (S3P) provides Director, Undersea Warfare Division (OPNAV N97) with qualitative and quantitative analysis of potential SSN and SSGN submarine vulnerabilities based on technology threats and operational requirements and recommends countermeasure concepts to mitigate these potential vulnerabilities. S3P informs the entire $10B submarine portfolio with validated analysis which informs risk to submarine stealth in contested environments. This analysis also informs methods by which stealth can be regained once compromised to execute missions such as weapons employment. S3P conducts technical analysis validated with at-sea testing. The technical analysis is put into an operational context using data from current submarine operations and also evolving Fleet war plans. S3P develops technologies and tools to increase the survivability of submarines by recognizing and mitigating sources of acoustic and non-acoustic vulnerabilities that put a submarine at risk when penetrating contested waters and operating in the littorals. S3P supports fleet development of Tactics, Techniques, and Procedures (TTPs) that facilitate new or enhance existing warfighting concepts.

***FY 2018 Plans:***

FY 2018, funding for S3P activity shifts from Project 2033 to Project 3391.

S3P will continue to address gaps in stealth and survivability for the current and future SSN/SSGN force to include responding to fleet questions on current tactical vulnerabilities and completion of an annual Operational Survivability Assessment. S3P will conduct acoustic and non-acoustic vulnerability assessment projects, and

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>3391 / *SSN/SSGN Survivability Program* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| will conduct sea tests to better characterize vulnerability and evaluate two developmental Tactical Decision Aids. Details can be provided in a classified setting.<br><br>***FY 2019 Base Plans:***<br>S3P will continue to address gaps in stealth and survivability for the current and future SSN/SSGN force to include responding to fleet questions on current tactical vulnerabilities and completion of an annual Operational Survivability Assessment. S3P will conduct acoustic, non-acoustic, and non-traditional ASW vulnerability assessment projects, and will conduct sea tests in support of the Acoustic Superiority project along with beginning the transition of two developmental Tactical Decision Aids to programs of record. Details can be provided in a classified setting.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Decrease from FY18 to FY19 is in accordance with planned program profile and is not due to a negative action against this effort. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 8.594 | 8.327 | 0.000 | 8.327 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

S3P is a non-acquisition activity which investigates, prioritizes, and validates SSN/SSGN survivability issues for peacetime and all phases of war. S3P also proposes and directs development and validation of countermeasure concepts. S3P works to ensure alignment between OPNAV, NAVSEA, ONI, and the Fleet on survivability issues. S3P will develop recommendations for stealth requirements to OPNAV N97 and provide technical basis for Tactics, Techniques, and Procedures developed by the Undersea Warfighting Development Command (UWDC). S3P will operate under OPNAV N97 and Fleet Flag panel (Operations Review Group) oversight. Products and metrics will be evaluated by the Submarine Operations Group and Operations Review Group. S3P will recommend technical requirements on all matters of submarine survivability to OPNAV N97.

**E. Performance Metrics**

Conduct in-depth assessment of SSN/SSGN Survivability for peacetime and wartime operations in contested environment. Respond to emergent fleet tasking to assess real-world vulnerability concerns. Complete annual SSN/SSGN Operational Survivability Assessment report for ORG. Conduct 3-4 vulnerability assessments per fiscal

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>3391 / *SSN/SSGN Survivability Program* |

year (each assessment is a 2-12 month level of effort). Conduct 1-3 countermeasure development efforts per fiscal year (each project is a 2-3 year level of effort). Specific technical topics each year are selected based on Fleet needs (as validated by the ORG), evolving threats, and mission requirements.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>3391 / *SSN/SSGN Survivability Program* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Product Development | MIPR | CNA: : Alex, VA | 0.000 | 0.000 | | 0.447 | Jan 2018 | 0.448 | Jan 2019 | - | | 0.448 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | MIT-LL : Cambridge, MA | 0.000 | 0.000 | | 0.626 | Oct 2017 | 0.627 | Oct 2018 | - | | 0.627 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | Raytheon : Portmouth, RI | 0.000 | 0.000 | | 0.308 | Oct 2017 | 0.309 | Oct 2018 | - | | 0.309 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | JHU/APL : Laurel, MD | 0.000 | 0.000 | | 2.263 | Oct 2017 | 2.137 | Oct 2018 | - | | 2.137 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | UT/ARL : Austin, TX | 0.000 | 0.000 | | 1.044 | Oct 2017 | 1.045 | Oct 2018 | - | | 1.045 | Continuing | Continuing | Continuing |
| Product Development | WR | NUWC : Newport, RI | 0.000 | 0.000 | | 1.198 | Oct 2017 | 1.159 | Oct 2018 | - | | 1.159 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | SPA : Arlington, VA | 0.000 | 0.000 | | 0.208 | Dec 2017 | 0.209 | Dec 2018 | - | | 0.209 | Continuing | Continuing | Continuing |
| Product Development | C/BA | NSMA : Not Specified | 0.000 | 0.000 | | 0.592 | Dec 2017 | 0.592 | Dec 2018 | - | | 0.592 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | Applied Mathmetics Int : Gales Ferry, CT | 0.000 | 0.000 | | 0.200 | Oct 2017 | 0.200 | Oct 2018 | - | | 0.200 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | Lambda Sciences : Alexadria, VA | 0.000 | 0.000 | | 0.200 | Oct 2017 | 0.100 | Oct 2018 | - | | 0.100 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 7.086 | | 6.826 | | - | | 6.826 | Continuing | Continuing | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Travel and Corporate | WR | NAVSEA HQ : Not Specified | 0.000 | 0.000 | | 0.420 | Oct 2017 | 0.413 | Oct 2018 | - | | 0.413 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.420 | | 0.413 | | - | | 0.413 | Continuing | Continuing | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603561N / *Advanced Submarine System Development* | Project (Number/Name)<br>3391 / *SSN/SSGN Survivability Program* | |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Developmental Test & Evaluation | WR | NSWC : Carderock, MD | 0.000 | 0.000 | | 0.601 | Apr 2018 | 0.601 | Apr 2019 | - | | 0.601 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.601 | | 0.601 | | - | | 0.601 | Continuing | Continuing | N/A |

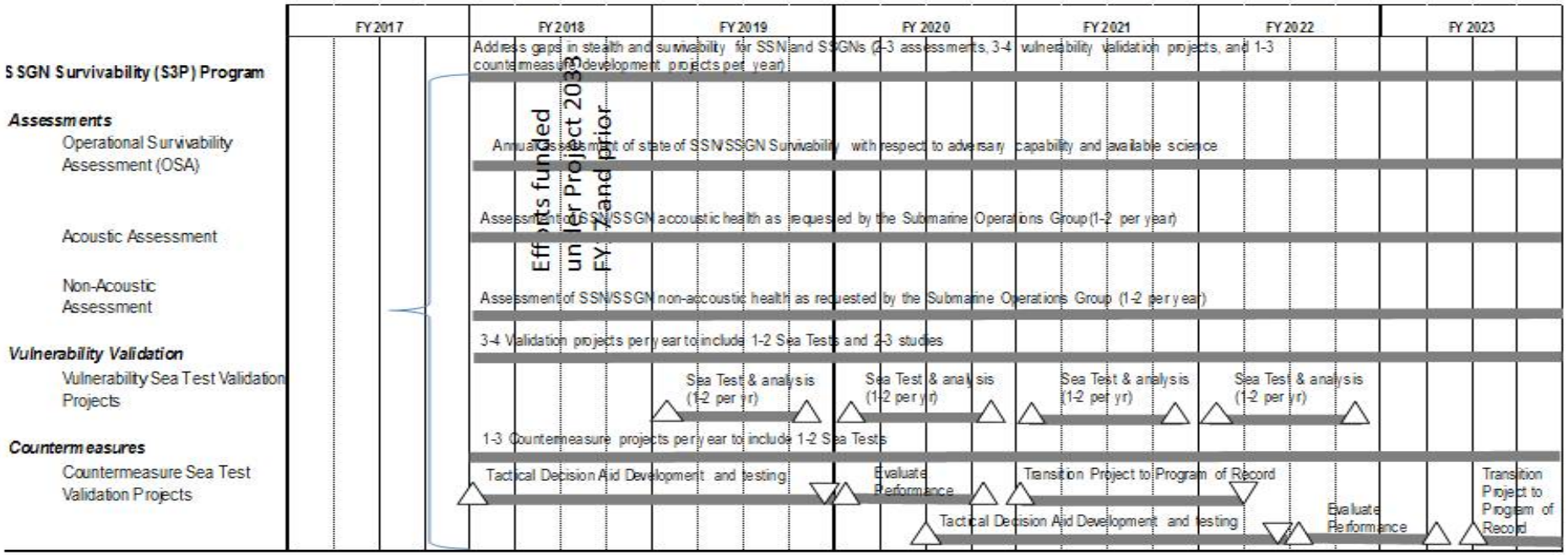
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Management Services | SS/CPFF | Sonalyst : Not Specified | 0.000 | 0.000 | | 0.487 | Dec 2017 | 0.487 | Dec 2018 | - | | 0.487 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.487 | | 0.487 | | - | | 0.487 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 8.594 | | 8.327 | | - | | 8.327 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>3391 / *SSN/SSGN Survivability Program* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>3391 / *SSN/SSGN Survivability Program* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Assessments*** | | | | |
| Operational Survivability Assessment | 1 | 2019 | 4 | 2023 |
| Acoustic Assessment | 1 | 2019 | 4 | 2023 |
| Non-Acoustic Assessment | 1 | 2019 | 4 | 2023 |
| ***Vulnerability Validation*** | | | | |
| Vulnerability Projects (3-4 per year) | 1 | 2019 | 4 | 2023 |
| Sea Test Validation Program (1-2 per year) | 1 | 2019 | 4 | 2023 |
| ***Countermeasures*** | | | | |
| Countermeasure Validation (2-3 per year) | 1 | 2019 | 4 | 2023 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603561N / *Advanced Submarine System Development* | Project (Number/Name)<br>9999 / *Congressional Adds* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9999: *Congressional Adds* | 0.000 | 24.179 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 24.179 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Develop a full-scale prototype Advanced Material Propeller (AMP)for demonstration on a Royal Australian Navy submarine. Develop future propulsor design concepts and Next Generation (NG) Thrust technologies. Develop and demonstrate alternative and advanced materials for new integrated shaft and propulsor designs.

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2017 | FY 2018 |
|---|---|---|
| ***Congressional Add:*** Advanced Materials Propeller Research | 24.179 | 0.000 |
| ***FY 2017 Accomplishments:*** Completed AMP Structural Certification Plan to obtain approvals from US and AUS authorities that propeller is acceptable for at sea test. Complete testing of AMP Gen 2 full scale hardware to validate acceptance predictions. | | |
| ***FY 2018 Plans:*** Complete manufacture of the Advanced Material Propeller (AMP) trial propeller and collection of Objective Quality Evidence (OQE) to support approval of hardware for the sea trial acceptance package. Finalize AMP trial planning and run prioritization in support of US-AUS project arrangement. Complete AMP instrumentation, tool validation and load predictions. Define and evaluate new/alternative Next Generation Thrust (NGT) technologies, perform advanced material studies, develop design simulation tools and define system concepts. Develop an integrated shaft and propulsor design concept and prototype using advanced materials for large scale vehicle demonstration. | | |
| **Congressional Adds Subtotals** | 24.179 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

**E. Performance Metrics**

Complete all required testing and obtain approvals n the AMP Structural Certification Plan.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>9999 / *Congressional Adds* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Product Development | C/CPFF | Seemann Composities Inc : Gulf Port, MS | 0.000 | 13.420 | Sep 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 13.420 | - |
| Product Development | C/CPIF | Rolls Royce Marine : Walpole, MA | 0.000 | 4.563 | Sep 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 4.563 | - |
| Product Development | C/CPFF | Electric Boat : Groton, CT | 0.000 | 0.175 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.175 | - |
| Product Development | C/CPFF | BAH : Manassas, VA | 0.000 | 0.075 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.075 | - |
| Product Development | C/CPFF | Alion : Washington, DC | 0.000 | 0.598 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.598 | - |
| Product Development | C/CPFF | ARL/PSU : Groton, CT | 0.000 | 2.277 | Sep 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.277 | - |
| Product Development | C/CPFF | ARL/JHU : Columbia, MD | 0.000 | 0.090 | Sep 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.090 | - |
| Product Development | Various | NSWC/CD : Bethesda, MD | 0.000 | 2.881 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.881 | - |
| Product Development | Various | NSWC/Philadelphia : Philadelphia, PA | 0.000 | 0.075 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.075 | - |
| Product Development | Various | NRL : Washington, DC | 0.000 | 0.025 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.025 | - |
| | | **Subtotal** | 0.000 | 24.179 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 24.179 | N/A |

**Test and Evaluation ($ in Millions)**

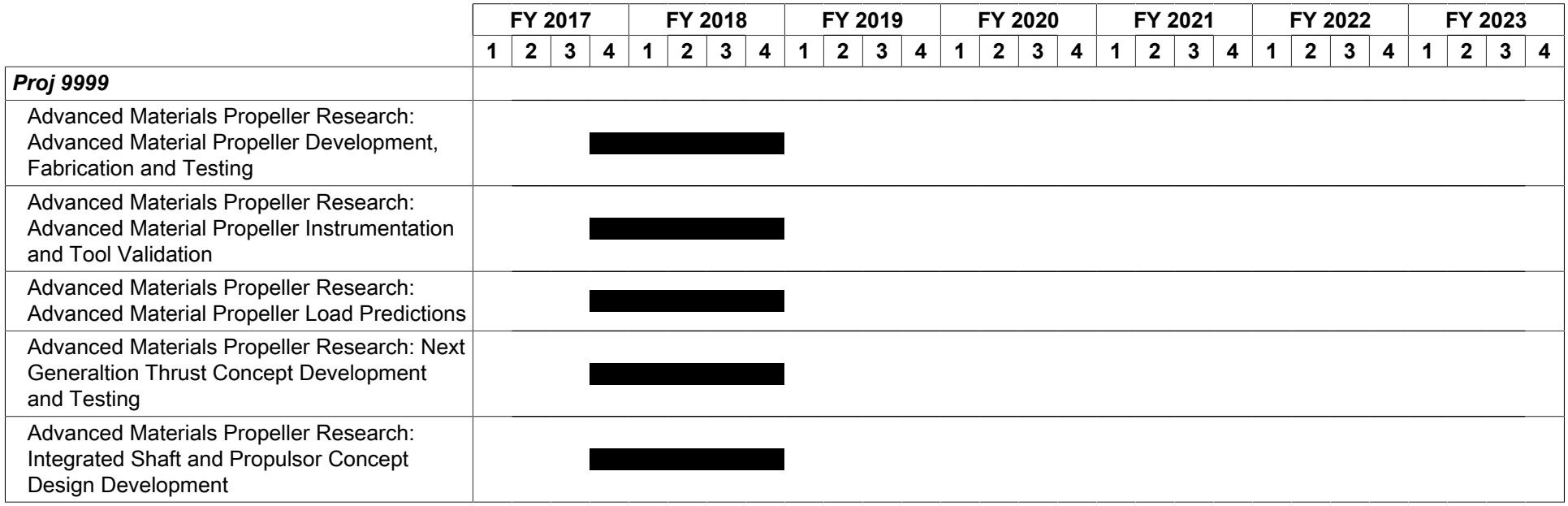
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Test and Evaluation | SS/CPFF | Not Specified : Not Specified | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603561N / *Advanced Submarine System Development* | Project (Number/Name)<br>9999 / *Congressional Adds* | |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 24.179 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 24.179 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>9999 / *Congressional Adds* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603561N / *Advanced Submarine System Development* | **Project (Number/Name)**<br>9999 / *Congressional Adds* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 9999*** | | | | |
| Advanced Materials Propeller Research: Advanced Material Propeller Development, Fabrication and Testing | 4 | 2017 | 4 | 2018 |
| Advanced Materials Propeller Research: Advanced Material Propeller Instrumentation and Tool Validation | 4 | 2017 | 4 | 2018 |
| Advanced Materials Propeller Research: Advanced Material Propeller Load Predictions | 4 | 2017 | 4 | 2018 |
| Advanced Materials Propeller Research: Next Generaltion Thrust Concept Development and Testing | 4 | 2017 | 4 | 2018 |
| Advanced Materials Propeller Research: Integrated Shaft and Propulsor Concept Design Development | 4 | 2017 | 4 | 2018 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603562N *I Submarine Tactical Warfare Sys* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 75.297 | 8.603 | 13.834 | 9.374 | - | 9.374 | 11.314 | 11.551 | 13.365 | 12.031 | Continuing | Continuing |
| 0770: *Adv Sub Supp Equip Prog* | 18.750 | 4.419 | 4.155 | 4.307 | - | 4.307 | 4.672 | 4.777 | 4.866 | 4.977 | Continuing | Continuing |
| 1739: *Submarine Arctic W/F Development* | 56.547 | 4.184 | 9.679 | 5.067 | - | 5.067 | 6.642 | 6.774 | 8.499 | 7.054 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

Project 0770 - The Advanced Submarine Support Equipment Program (ASSEP) objective is to improve submarine operational effectiveness through the development and implementation of advanced Research and Development (R&D). In order to provide improved operational effectiveness, R&D efforts are focused on Advanced Imaging Developments and Advanced Electronic Warfare Support (ES) Developments. A continuing need exists to improve these capabilities in view of the advancements in potential imaging counter detection, the need to support specialized missions, and the increasingly dense and sophisticated electronic environment caused by the proliferation of complex radar, communications, and navigation equipment of potential adversaries. Ongoing developments in 360 degree imaging systems and electro-optic infra-red vulnerability signature reduction technologies are supporting these needs.

Project 1739 - The Submarine Arctic Warfare Development Project responds to the increased threat of naval activity in the Arctic regions while continuously supporting the Navy's strategic objective of Assured Access and Combat Credibility. The U.S. Navy Submarine Force (SUBFOR) demonstrates existing Arctic Warfare capabilities, and operational and tactical proficiency, while developing advanced submarine research and development technology in unique cold water environments, under-ice conditions, and ice-covered shallow water regions during Ice Exercises (ICEX). Tactical Development (TACDEV) ICEXs are conducted biennially and require up front comprehensive planning and work-up training, as well as post exercise analysis and reporting. ICEXs provide the framework for various submarine research and development programs to conduct test and evaluation in Arctic regions or at periodic Ice Camps. Particular emphasis is placed on the areas of sonar operability, tactical surveillance, weapon utility, and other submarine support missions. Efforts include assessment of combat system effectiveness, development of Arctic specific improvements for existing sonar and weapons, development of class-specific Arctic operational guidelines, and the testing of ice-capable submarine support structures.

Major ICEXs, occurring every four (4) years (FY 2018, FY 2022, etc) include a Fleet requirement to conduct exercise torpedo (EXTORP) firings in the Arctic. A Torpedo Exercise (TORPEX) requires significantly higher level of logistics, personnel, and infrastructure to account for the recovery and transportation efforts of the EXTORPs.

This Project also provides SUBFOR a cadre of trained Arctic Operation Specialists (AOS) and an inventory of unique Arctic sensors to optimize submarine safety during under-ice operations.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603562N *I Submarine Tactical Warfare Sys* |

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 8.782 | 13.834 | 9.545 | - | 9.545 |
| Current President's Budget | 8.603 | 13.834 | 9.374 | - | 9.374 |
| Total Adjustments | -0.179 | 0.000 | -0.171 | - | -0.171 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -0.178 | 0.000 | | | |
| • Rate/Misc Adjustments | -0.001 | 0.000 | -0.171 | - | -0.171 |

**Change Summary Explanation**

Project 1739 Funding:

The FY 2018 to FY 2019 decrease is due to the completion of the major TORPEX/TACDEV event in FY 2018. There are no major ICEX events planned in FY 2019; efforts are directed at ICEX 2020 planning/work-up.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603562N / *Submarine Tactical Warfare Sys* | Project (Number/Name)<br>0770 / *Adv Sub Supp Equip Prog* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0770: *Adv Sub Supp Equip Prog* | 18.750 | 4.419 | 4.155 | 4.307 | - | 4.307 | 4.672 | 4.777 | 4.866 | 4.977 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

A continuing need exists to improve Imaging and Electronic Warfare support (EW) capabilities in view of the advancements in potential imaging counter detection and the increasingly dense electromagnetic environment caused by the proliferation of complex radar, communications, and navigation equipment of potential adversaries. Improvements are necessary for submarine EW and Imaging to be operationally effective in the following mission areas: Joint Littoral Warfare, Joint Surveillance, Space and Electronic Warfare, Intelligence Collection, Maritime Protection, and Joint Strike. The program is divided into two project categories: Advanced Imaging Project Development and Advanced Electronic Warfare Support Project Development. Both of these categories will allow for the mitigation of submarine masts, periscopes, and sensors to visual, radar, and infrared detection. Evaluation of state of the art technology to implement periscope/mast improvements via EW electromagnetic and electro-optic sensors results in improved capability. Engineering Demonstration Models (EDMs) are developed, evaluated, and validated in the lab and through at-sea testing.

The FY19 Advanced Imaging Project Development projects include Anti Reflective Coating Spherical Domes, Volumetric Atmospheric Modeling, Low Power Fiber Delivered Laser Range Finder, Reduced Cost Fabrication of Optical Sapphire Hyper-hemispheres, Vulnerability Improvement, Submarine Meteorological Sensors, System For Non-Acoustic Control of Signatures (SNACS), Imaging Buoy, Near Ocean Imaging through Atmospheric Turbulence and a Project Arrangement (PA) with Australia covering Electromagnetic Spectrum Sensor System Simulation & Development for model-based mission planning.

FY18 to FY19 cost growth is due to test events associated with Anti Reflective Coating Spherical Domes, Volumetric Atmospheric Modeling, and Low Power Fiber Delivered Laser Range Finder.

The FY19 Advanced EW Project Development projects include the development of: Extremely Wideband Digital Receiver (NATO Nunn Project with NAVAIR and Australia), Multi-Functional Apertures, Disposable Decoy Buoys, ISR and Tethered Buoys and Antennas, Radio Frequency (RF) over Fiber (RFoF), Micro Adaptive Training, Mast Antenna Coupler, Ruggedized High speed Optical Fiber Network Connector Interfaces, Data Transmission Using Visible Light Communications (VLC), DISARMER, Digital Early Warning Receiver, Tunable Optic Filters for Radio Frequencies Photonic Signal Distribution Systems and Solid State RADAR Emitter Identification.

All programs funded in this project are non-Acquisition Category (ACAT) programs. The test articles identified consist of critical components that will be fully developed during Engineering Manufacturing and Development phase into EDMs.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Advanced Imaging Project Development | 3.242 | 2.360 | 2.561 | 0.000 | 2.561 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603562N / *Submarine Tactical Warfare Sys* | **Project (Number/Name)**<br>0770 / *Adv Sub Supp Equip Prog* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:*** | | | | | |
| Complete TOTIM Land Based ISIS System Architecture Design Development, Testing and Transition to Imaging | | | | | |
| Completed RF Vulnerability Reduction (RAS) Lab Test and Transitioned to Imaging | | | | | |
| Complete Automatic Aircraft Cueing Lab Test and Transition to Imaging | | | | | |
| Complete SBIR- Passive Ranging Development and Transition to Imaging | | | | | |
| Complete GPS Denied Navigation Lab Test and Transition to Imaging | | | | | |
| Complete Meteorological Sensors Test and Continue Development | | | | | |
| Complete Low Power Fiber Delivered Laser Range Finder Lab Test and continue Development | | | | | |
| Complete Reduced Cost Fabrication of Optical Sapphire Hyper-hemispheres Lab Test and Continue Development | | | | | |
| Continue Anti-reflective Coating Spherical Domes Development | | | | | |
| Continue Volumetric Atmospheric Modeling Development | | | | | |
| Continue PA Electromagnetic Spectrum Sensor System Simulation Development | | | | | |
| Start Vulnerability Improvement Development | | | | | |
| Complete RCS Test and Transition to Imaging | | | | | |
| Start System for Non-Acoustic Control of Signatures (SNACS) Development | | | | | |
| Start Near Ocean Imaging through Atmospheric Turbulence Development | | | | | |
| ***FY 2019 Base Plans:*** | | | | | |
| Complete Low Power Fiber Delivered Laser Range Finder Lab Test and Continue Development | | | | | |
| Complete Reduced Cost Fabrication of Optical Sapphire Hyper-hemispheres Lab Test and Continue Development | | | | | |
| Complete Anti-reflective Coating Spherical Domes Lab Test and Continue Development | | | | | |
| Complete Volumetric Atmospheric Modeling Lab Test and Continue Development | | | | | |
| Complete PA Electromagnetic Spectrum Sensor System Simulation Lab Test and Continue Development | | | | | |
| Continue SNACS Development | | | | | |
| Continue Vulnerability Improvement Development | | | | | |
| Continue Near Ocean Imaging through Atmospheric Turbulence Development | | | | | |
| Continue Meteorological Sensors Development | | | | | |
| ***FY 2019 OCO Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603562N / *Submarine Tactical Warfare Sys* | **Project (Number/Name)**<br>0770 / *Adv Sub Supp Equip Prog* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Increase of $201 thousand in FY19 from FY18 is in support of a planned increase in Project Agreement Electromagnetic Spectrum Sensor System Simulation Development efforts in partnership with the Royal Australian Navy. | | | | | |
| ***Title:*** Advanced Electronic Warfare Support (EW) Project Development | 1.177 | 1.795 | 1.746 | 0.000 | 1.746 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Complete Enhanced DeInterleavers Lab Test and Transition to EW<br>Complete Human Machine Interface (HMI) Lab Demo and Transition to EW<br>Continued Solid State RADAR Emitter Identification Development<br>Complete LPI DF Lab Test and Transition to EW<br>Complete EWR Phase II Development and Continue Development<br>Complete Large Time Bandwidth Receiver Lab Test and transition to EW<br>Continue Extremely Wideband Digital Receiver Development<br>Complete EW Digital Direction Finding Lab Test and Transition to EW<br>Complete RFOF Submarine Mast Integration Lab Test and Transition to EW<br>Complete Next Generation SIGINT Processing Infrastructure High Speed Backbone Lab Test and Transition to EW<br>Continue Disposable Buoy Modular Expendable Decoy enhancements - Development S&T<br>Continue Disposable Buoy Modular Expendable Intelligence Surveillance and reconnaissance (ISR) Development S&T<br>Continue Tethered Buoy Modular Tethered Antenna Development S&T<br>Continue Tethered Buoy Radio Frequency over Fiber (RFoF) Development S&T<br>Continue Precision DF Development<br>Complete Multifunction Apertures (SUBSTAR FNC) Lab Test and Continue Development | | | | | |
| ***FY 2019 Base Plans:***<br>Complete EW Digital Direction Finding Lab Test and Continue Development<br>Complete Extremely Wideband Digital Receiver Lab Test and Continue Development<br>Complete Disposable Buoy Modular Expendable Decoy enhancements Lab Test and Continue Development | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603562N / *Submarine Tactical Warfare Sys* | **Project (Number/Name)**<br>0770 / *Adv Sub Supp Equip Prog* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Complete Disposable Buoy Modular Expendable Intelligence Surveillance and reconnaissance (ISR) Lab Test and Continue Development<br>Complete Tethered Buoy Modular Tethered Antenna Lab Test and Continue Development<br>Complete Tethered Buoy Radio Frequency over Fiber (RFoF) Lab Test and Continue Development<br>Complete Precision DF Lab Test and Transition to EW<br>Complete Multifunction Apertures (SUBSTAR FNC) Lab Test and Transition to EW<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Decrease of $49 thousand in FY19 from FY18 Advanced Electronic Warfare Development is due to planned increase in Advanced Imaging Development Project Agreement Electromagnetic Spectrum Sensor System Simulation Development efforts in partnership with the Royal Australian Navy. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 4.419 | 4.155 | 4.307 | 0.000 | 4.307 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

This project optimizes technology insertion using a build-test-build approach to support EW and Imaging operational needs. Operational needs have been based on the tactical requirements identified in the Common Submarine Imaging System (CSIS) (CDD# 849-87-11) dtd 22 Dec 2011 for Submarine Imaging Systems, and the Common Submarine Electronic Warfare System (CSEWS) (CDD# 907-97-16) dtd 27 Sep 2016 for the Electronic Warfare Systems. Project efforts develop submarine unique improvements to mast, periscope, and EW electromagnetic spectrum and electro-optic sensors based on emerging technologies that are available from DoD Exploratory Development Programs, industry Independent Research and Development, and other sources. Engineering Demonstration Models (EDMs) will be developed to provide a realistic method of evaluating the improvements, including deployment on submarines for testing.

**E. Performance Metrics**

The Research, Development and Demonstration (RDD) program goal is to respond to urgent operational needs within 30 days and provide for rapid development and fielding of prototype solutions within 270 days.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603562N / *Submarine Tactical Warfare Sys* | Project (Number/Name)<br>0770 / *Adv Sub Supp Equip Prog* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Systems Engineering | WR | NUWC : RI | 16.996 | 3.378 | Nov 2016 | 4.127 | Nov 2017 | 4.279 | Nov 2018 | - | | 4.279 | Continuing | Continuing | Continuing |
| Primary Software Deveopment | WR | SSC PAC : CA | 1.278 | 0.163 | May 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.441 | - |
| Primary Hardware Development | WR | NSWC CD : MD | 0.175 | 0.260 | May 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.435 | - |
| Primary Software and Hardware Development | MIPR | MIT/LL : MA | 0.000 | 0.590 | Jun 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.590 | - |
| | | **Subtotal** | 18.449 | 4.391 | | 4.127 | | 4.279 | | - | | 4.279 | Continuing | Continuing | N/A |

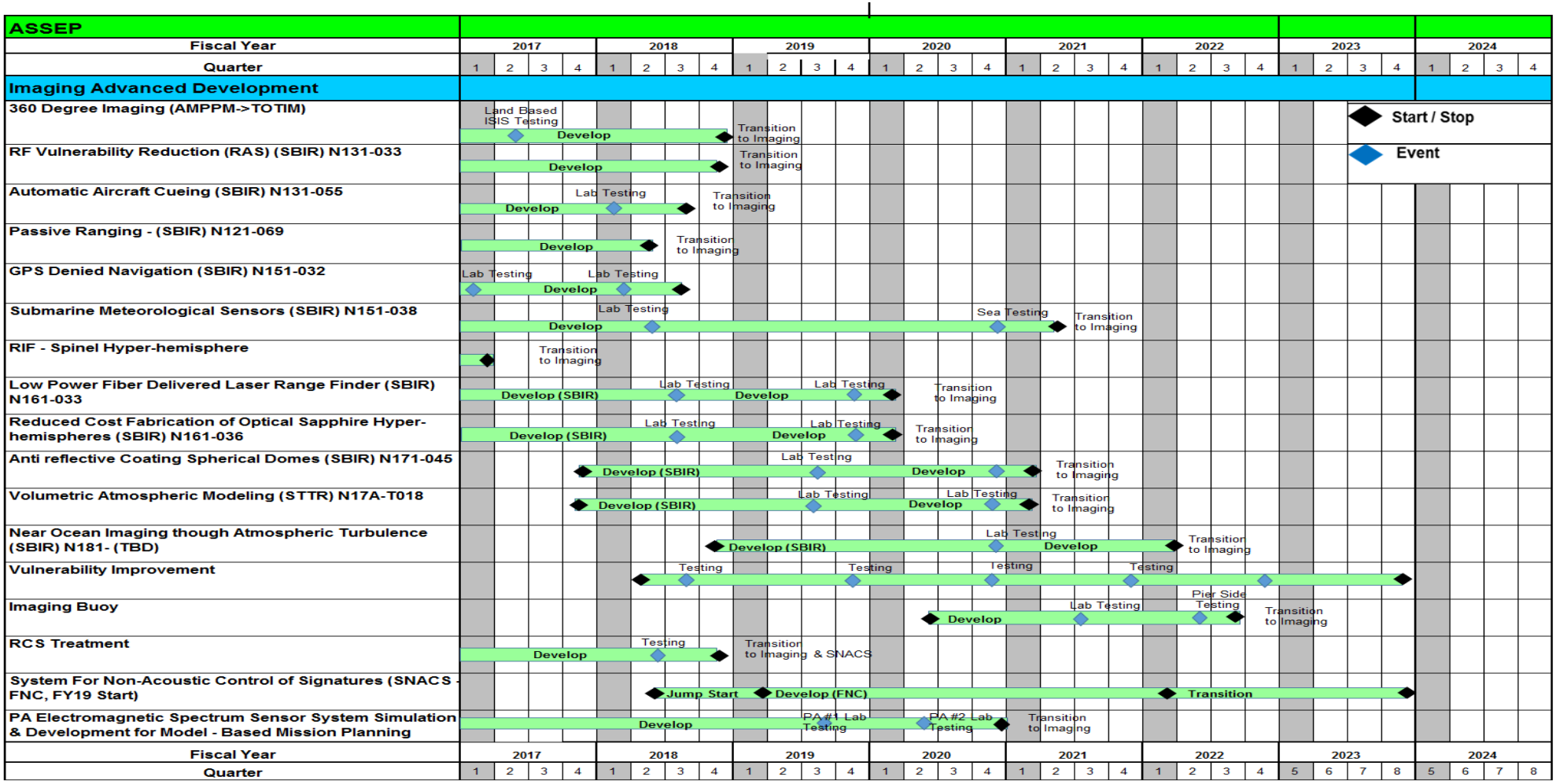
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Travel | WR | NAVSEA : WNY | 0.301 | 0.028 | Nov 2016 | 0.028 | Nov 2017 | 0.028 | Nov 2018 | - | | 0.028 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.301 | 0.028 | | 0.028 | | 0.028 | | - | | 0.028 | Continuing | Continuing | N/A |

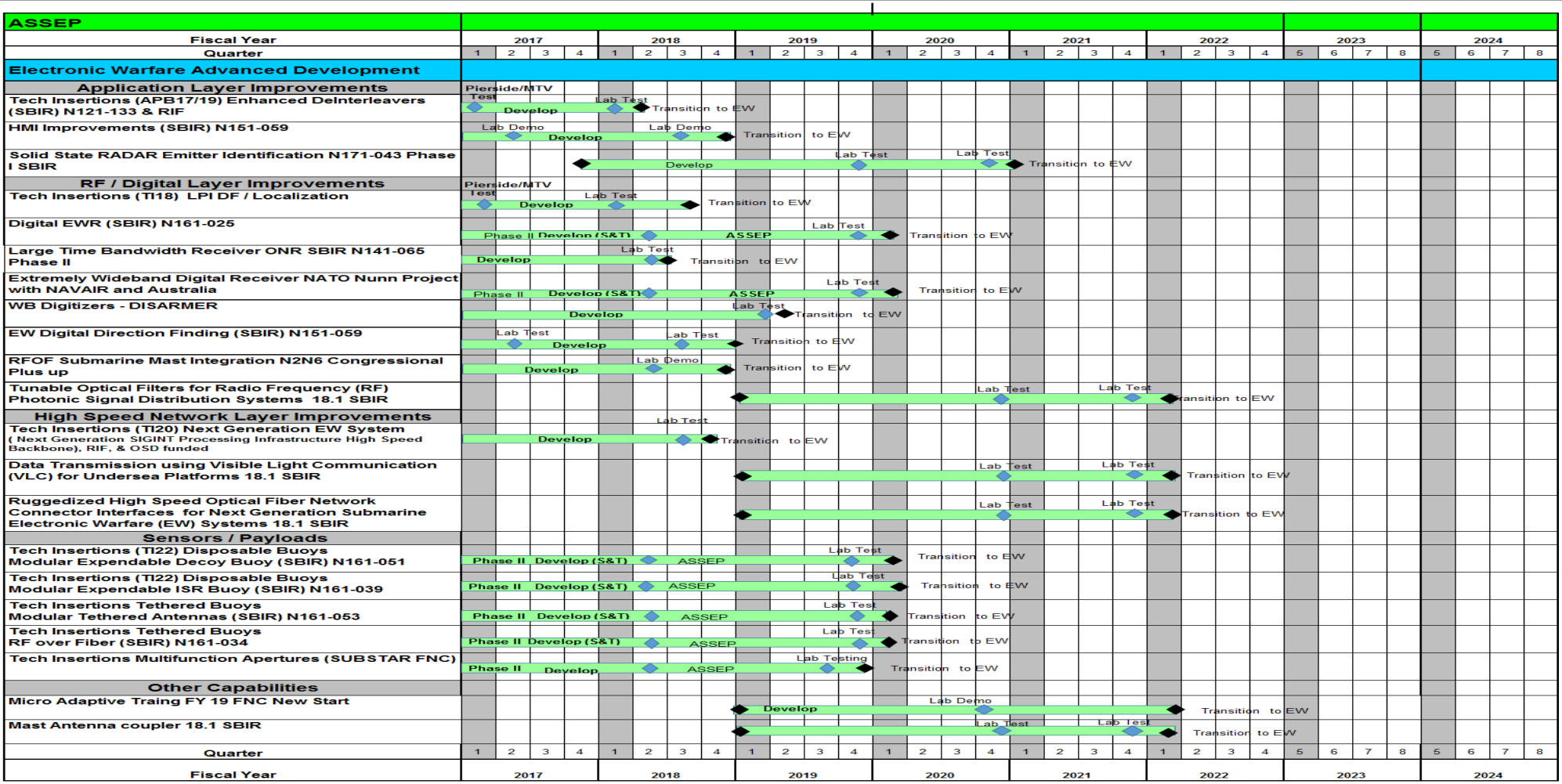
| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 18.750 | 4.419 | | 4.155 | | 4.307 | | - | | 4.307 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603562N / *Submarine Tactical Warfare Sys* | **Project (Number/Name)**<br>0770 / *Adv Sub Supp Equip Prog* |



| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603562N / *Submarine Tactical Warfare Sys* | **Project (Number/Name)**<br>0770 / *Adv Sub Supp Equip Prog* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603562N / *Submarine Tactical Warfare Sys* | **Project (Number/Name)**<br>0770 / *Adv Sub Supp Equip Prog* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Imaging Advanced Development*** | | | | |
| 360 Degree Imaging (TOTIM) Land Based Integration Testing | 2 | 2017 | 2 | 2017 |
| 360 Degree Imaging (TOTIM) Transition to Imaging | 4 | 2018 | 4 | 2018 |
| RF Vulnerability Reduction (RAS) | 4 | 2018 | 4 | 2018 |
| Automatic Aircraft Cueing Lab Test | 1 | 2018 | 1 | 2018 |
| Automatic Aircraft Cueing Transition to Imaging | 3 | 2018 | 3 | 2018 |
| Passive Ranging Transition to Imaging | 2 | 2018 | 2 | 2018 |
| GPS Denied Navigation Lab Test | 1 | 2017 | 1 | 2017 |
| GPS Denied Navigation Lab Test #2 | 1 | 2018 | 1 | 2018 |
| GPS Denied Navigation Transition to Imaging | 3 | 2018 | 3 | 2018 |
| Submarine Meteorological Sensors Lab Test | 2 | 2018 | 2 | 2018 |
| Submarine Meteorological Sensors SeaTest #2 | 4 | 2020 | 4 | 2020 |
| Submarine Meteorological Sensors Transition to Imaging | 2 | 2021 | 2 | 2021 |
| Spinel Hyper-hemisphere Transition to Imaging | 1 | 2017 | 1 | 2017 |
| Low Power Fiber Delivered Laser Range Finder Lab Test | 3 | 2018 | 3 | 2018 |
| Low Power Fiber Delivered Laser Range Finder Lab Test #2 | 4 | 2019 | 4 | 2019 |
| Low Power Fiber Delivered Laser Range Finder Transition to Imaging | 1 | 2020 | 1 | 2020 |
| Reduced Cost Fabrication of Optical Sapphire Hyper-hemispheres Lab Test | 3 | 2018 | 3 | 2018 |
| Reduced Cost Fabrication of Optical Sapphire Hyper-hemispheres Lab Test #2 | 4 | 2019 | 4 | 2019 |
| Reduced Cost Fabrication of Optical Sapphire Hyper-hemispheres Transition to Imaging | 1 | 2020 | 1 | 2020 |
| Anti reflective Coating Spherical Domes Development | 4 | 2017 | 4 | 2017 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603562N / *Submarine Tactical Warfare Sys* | **Project (Number/Name)**<br>0770 / *Adv Sub Supp Equip Prog* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Anti reflective Coating Spherical Domes Lab Test | 3 | 2019 | 3 | 2019 |
| Anti reflective Coating Spherical Domes Lab Test #2 | 4 | 2020 | 4 | 2020 |
| Anti reflective Coating Spherical Domes Transition to Imaging | 1 | 2021 | 1 | 2021 |
| Volumetric Atmospheric Modeling Development | 4 | 2017 | 4 | 2017 |
| Volumetric Atmospheric Modeling Lab Test | 3 | 2019 | 3 | 2019 |
| Volumetric Atmospheric Modeling Lab Test #2 | 4 | 2020 | 4 | 2020 |
| Volumetric Atmospheric Modeling Transition to Imaging | 1 | 2021 | 1 | 2021 |
| Near Ocean Imaging though Atmospheric Turbulence Development | 4 | 2018 | 4 | 2018 |
| Near Ocean Imaging though Atmospheric Turbulence Lab Test | 4 | 2020 | 4 | 2020 |
| Near Ocean Imaging though Atmospheric Turbulence Transition to Imaging | 1 | 2022 | 1 | 2022 |
| Vulnerability Improvement Development | 2 | 2018 | 3 | 2023 |
| Vulnerability Improvement Lab Test | 3 | 2018 | 3 | 2018 |
| Vulnerability Improvement Lab Test #2 | 4 | 2019 | 4 | 2019 |
| Vulnerability Improvement Lab Test #3 | 4 | 2020 | 4 | 2020 |
| Vulnerability Improvement Lab Test #4 | 4 | 2021 | 4 | 2021 |
| Vulnerability Improvement Lab Test #5 | 4 | 2022 | 4 | 2022 |
| Vulnerability Improvement Transition to Imaging | 4 | 2023 | 4 | 2023 |
| Imaging Buoy Development | 2 | 2020 | 2 | 2020 |
| Imaging Buoy Lab Test | 3 | 2021 | 3 | 2021 |
| Imaging Buoy PiersideTest | 2 | 2022 | 2 | 2022 |
| Imaging Buoy Transition to Imaging | 3 | 2022 | 3 | 2022 |
| RCS Treatment Development | 1 | 2017 | 1 | 2017 |
| RCS Treatment Testing | 2 | 2018 | 2 | 2018 |
| RCS Treatment Transition to Imaging | 4 | 2018 | 4 | 2018 |
| System For Non-Acoustic Control of Signatures (SNACS - FNC, FY18 Jump Start) | 2 | 2018 | 2 | 2018 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603562N / *Submarine Tactical Warfare Sys* | **Project (Number/Name)**<br>0770 / *Adv Sub Supp Equip Prog* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| SNACS FY19 FNC Start | 1 | 2018 | 1 | 2018 |
| SNACS transition to Imaging | 4 | 2023 | 4 | 2023 |
| PA Electromagnetic Spectrum Sensor System Simulation & Dev for Model - Based Mission Planning Test | 3 | 2019 | 3 | 2019 |
| PA Electromagnetic Spectrum Sensor System Simulation & Dev for Model - Based Mission Planning Test #2 | 2 | 2020 | 1 | 2023 |
| PA Electromagnetic Spectrum Sensor System Simulation & Dev for Model - Based Mission Planning Transition to Imaging | 4 | 2020 | 1 | 2023 |
| Electronic Warfare Advanced Development: Tech Insertions (APB17/19) Enhanced DeInterleavers Pierside/MTV Test | 1 | 2017 | 1 | 2017 |
| Electronic Warfare Advanced Development: Tech Insertions (APB17/19) Enhanced DeInterleavers Lab Test | 1 | 2018 | 1 | 2018 |
| Electronic Warfare Advanced Development: Tech Insertions (APB17/19) Enhanced DeInterleavers - Transition to EW | 2 | 2018 | 2 | 2018 |
| Electronic Warfare Advanced Development: Digital Early Warning Receiver (EWR) Lab Test | 4 | 2019 | 4 | 2019 |
| Electronic Warfare Advanced Development: Digital Early Warning Receiver (EWR) Transition to EW | 1 | 2020 | 1 | 2020 |
| Electronic Warfare Advanced Development: Extremely Wideband Digital Receiver Lab Test | 4 | 2019 | 4 | 2019 |
| Electronic Warfare Advanced Development: Extremely Wideband Digital Receiver Transition to EW | 1 | 2020 | 1 | 2020 |
| Electronic Warfare Advanced Development: EW Digital Direction Finding Lab Test #1 | 2 | 2017 | 2 | 2017 |
| Electronic Warfare Advanced Development: EW Digital Direction Finding Lab Test #2 | 3 | 2018 | 3 | 2018 |
| Electronic Warfare Advanced Development: EW Digital Direction Finding Transition to EW | 4 | 2018 | 4 | 2018 |
| Electronic Warfare Advanced Development: HMI Lab Demo | 2 | 2017 | 2 | 2017 |
| Electronic Warfare Advanced Development: HMI Lab Demo #2 | 1 | 2018 | 1 | 2018 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603562N / *Submarine Tactical Warfare Sys* | **Project (Number/Name)**<br>0770 / *Adv Sub Supp Equip Prog* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Electronic Warfare Advanced Development: HMI Transition to EW | 2 | 2018 | 2 | 2018 |
| Electronic Warfare Advanced Development: Technical Insertions (TI-18) LPI DF / Localization Pierside/MTV Test | 1 | 2017 | 1 | 2017 |
| Electronic Warfare Advanced Development: Technical Insertions (TI-18) LPI DF / Localization Lab Test #2 | 1 | 2018 | 1 | 2018 |
| Electronic Warfare Advanced Development: Technical Insertions (TI-18) LPI DF / Localization Transition to EW | 3 | 2018 | 3 | 2018 |
| Electronic Warfare Advanced Development: Solid State RADAR Emitter Identification Development | 4 | 2017 | 4 | 2017 |
| Electronic Warfare Advanced Development: Solid State RADAR Emitter Identification Lab Test | 4 | 2019 | 4 | 2019 |
| Electronic Warfare Advanced Development: Solid State RADAR Emitter Identification Lab Test #2 | 4 | 2020 | 4 | 2020 |
| Electronic Warfare Advanced Development: Solid State RADAR Emitter Identification - Transition to EW | 1 | 2021 | 1 | 2021 |
| Electronic Warfare Advanced Development: Large Time Bandwidth Receiver Lab Test | 2 | 2018 | 2 | 2018 |
| Electronic Warfare Advanced Development: Large Time Bandwidth Receiver - Transition to EW | 3 | 2018 | 3 | 2018 |
| Electronic Warfare Advanced Development: DISARMER Lab Test | 1 | 2019 | 1 | 2019 |
| Electronic Warfare Advanced Development: DISARMER - transition to EW | 2 | 2019 | 2 | 2019 |
| Electronic Warfare Advanced Development: RFOF Submarine Mast Integration Lab Demo | 2 | 2018 | 2 | 2018 |
| Electronic Warfare Advanced Development: RFOF Submarine Mast Integration - Transition to EW | 4 | 2018 | 4 | 2018 |
| Electronic Warfare Advanced Development: Tunable Optical Filters for Radio Frequency (RF) Photonic Signal Distribution Systems | 1 | 2019 | 1 | 2019 |
| Electronic Warfare Advanced Development: Tunable Optical Filters for Radio Frequency (RF) Photonic Signal Distributions System Lab Test | 4 | 2020 | 4 | 2020 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603562N / *Submarine Tactical Warfare Sys* | **Project (Number/Name)**<br>0770 / *Adv Sub Supp Equip Prog* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Electronic Warfare Advanced Development: Tunable Optical Filters for Radio Frequency (RF) Photonic Signal Distribution Systems Lab Test #2 | 4 | 2021 | 4 | 2021 |
| Electronic Warfare Advanced Development: Tunable Optical Filters for Radio Frequency (RF) Photonic Signal Distribution Systems - Transition to EW | 1 | 2022 | 1 | 2022 |
| Electronic Warfare Advanced Development: Next Generation SIGINT Processing Infrastructure High Speed Backbone Lab Test | 3 | 2018 | 3 | 2018 |
| Electronic Warfare Advanced Development: Next Generation SIGINT Processing Infrastructure High Speed Backbone - Transition to EW | 4 | 2018 | 4 | 2018 |
| Electronic Warfare Advanced Development: Data Transmission using Visible Light Comms(VLC) for Undersea Platforms | 1 | 2019 | 1 | 2019 |
| Electronic Warfare Advanced Development: Data Transmission using Visible Light Comms (VLC) for Undersea Platforms Lab Test | 4 | 2020 | 1 | 2023 |
| Electronic Warfare Advanced Development: Data Transmission using Visible Light Comms (VLC) for Undersea Platforms Lab Test #2 | 4 | 2021 | 4 | 2021 |
| Electronic Warfare Advanced Development: Data Transmission using Visible Light Comms (VLC) for Undersea Platforms - Transition to EW | 1 | 2022 | 1 | 2022 |
| Electronic Warfare Advanced Development: Ruggedized High Speed Optical Fiber Network Connector Interfaces for NEXGEN EW | 1 | 2019 | 1 | 2019 |
| Electronic Warfare Advanced Development: Ruggedized High Speed Optical Fiber Network Connector Interfaces for NEXGEN EW Lab Test | 4 | 2020 | 4 | 2020 |
| Electronic Warfare Advanced Development: Ruggedized High Speed Optical Fiber Network Connector Interfaces for NEXGEN EW Lab Test #2 | 4 | 2021 | 4 | 2021 |
| Electronic Warfare Advanced Development: Ruggedized High Speed Optical Fiber Network Connector Interfaces for NEXGEN EW - Transitions to EW | 1 | 2022 | 1 | 2022 |
| Electronic Warfare Advanced Development: TI-22 Disposable Buoys Modular Expendable Decoy Buoy Enhancement - Lab Test | 4 | 2019 | 4 | 2019 |
| Electronic Warfare Advanced Development: TI-22 Disposable Buoys Modular Expendable Decoy Buoy Enhancement - Transition to EW | 1 | 2020 | 1 | 2020 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603562N / *Submarine Tactical Warfare Sys* | **Project (Number/Name)**<br>0770 / *Adv Sub Supp Equip Prog* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Electronic Warfare Advanced Development: TI-22 Disposable Buoys Modular Expendable ISR Buoy Lab Test | 4 | 2019 | 4 | 2019 |
| Electronic Warfare Advanced Development: TI-22 Disposable Buoys Modular Expendable ISR Buoy Transition to EW | 1 | 2020 | 1 | 2020 |
| Electronic Warfare Advanced Development: TI-22 Disposable Buoys Sub Launched Decoy Speed to Fleet Lab Test | 4 | 2019 | 4 | 2019 |
| Electronic Warfare Advanced Development: TI-22 Disposable Buoys Sub Launched Decoy Speed to Fleet Transition to EW | 1 | 2020 | 1 | 2020 |
| Electronic Warfare Advanced Development: TI Tethered Buoys Modular Tethered Antennas and RF Over Fiber Lab Test | 4 | 2019 | 4 | 2019 |
| Electronic Warfare Advanced Development: TI Tethered Buoys Modular Tethered Antennas and RF Over Fiber Transition to EW | 1 | 2020 | 1 | 2020 |
| Electronic Warfare Advanced Development: Technical Insertions Precision DF Lab Test | 2 | 2017 | 2 | 2017 |
| Electronic Warfare Advanced Development: Technical Insertions Precision DF Lab Test #2 | 3 | 2018 | 3 | 2018 |
| Electronic Warfare Advanced Development: Technical Insertions Precision DF Transition to EW | 4 | 2018 | 4 | 2018 |
| Electronic Warfare Advanced Development: Technical Insertions Multifunction Apertures Lab Test | 3 | 2019 | 3 | 2019 |
| Electronic Warfare Advanced Development: Technical Insertions Multifunction Apertures Transition to EW | 4 | 2019 | 4 | 2019 |
| Electronic Warfare Advanced Development: Micro Adaptive Training | 1 | 2019 | 1 | 2019 |
| Electronic Warfare Advanced Development: Micro Adaptive Training Lab Test | 4 | 2020 | 4 | 2020 |
| Electronic Warfare Advanced Development: Micro Adaptive Training Transition to EW | 1 | 2022 | 1 | 2022 |
| Electronic Warfare Advanced Development: Mast Antenna Coupler | 1 | 2019 | 1 | 2019 |
| Electronic Warfare Advanced Development: Mast Antenna Coupler Lab Test | 4 | 2020 | 4 | 2020 |
| Electronic Warfare Advanced Development: Mast Antenna Coupler Lab Test #2 | 4 | 2021 | 4 | 2021 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603562N / *Submarine Tactical Warfare Sys* | **Project (Number/Name)**<br>0770 / *Adv Sub Supp Equip Prog* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Electronic Warfare Advanced Development: Mast Antenna Coupler Transition to EW | 1 | 2022 | 1 | 2022 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603562N / *Submarine Tactical Warfare Sys* | Project (Number/Name)<br>1739 / *Submarine Arctic W/F Development* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1739: *Submarine Arctic W/F Development* | 56.547 | 4.184 | 9.679 | 5.067 | - | 5.067 | 6.642 | 6.774 | 8.499 | 7.054 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The Submarine Arctic Warfare Development Project responds to the increased threat of submarine and surface ship activity in Arctic regions of the world through the development of advanced submarine concepts. It places particular emphasis on submarine operability and mission support in unique, cold, ice-covered environments. Efforts include assessment of combat system effectiveness, weapons testing, use of High Frequency (HF) sonars in Arctic regions, testing of ice-capable submarine structures, and development of class-specific Arctic operational guidelines. This project also provides the framework for various research and development programs to conduct test and evaluation in shallow water and Arctic regions.

Increase in funding from FY 2017 to FY 2018 is driven by the requirement to fund the major TACDEV/TORPEX ICEX events planned in FY 2018, which necessitate additional aviation, personnel, logistics, and torpedo recovery resources than those required for a non-firing (TACDEV only) ICEX event. There are no major TACDEV/ TORPEX ICEX events planned in FY 2019. Increase in funding in FY 2019, as compared to FY 2017, is driven by the additional need to conduct Arctic operations to support ice camp equipment evaluation, systems development, and extreme cold weather training, as well as the need to perform drifting sea ice analysis required to improve drifting sea ice camp Arctic operations.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Conduct ICEX and Arctic Transit Mission, ICEX Workup and Training, Ice Camps | 4.184 | 9.679 | 5.067 | 0.000 | 5.067 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Conduct Arctic work-up training, ICEX mission 1-2018, and Ice Camp 1-2018.<br><br>Conduct ICEX 2018 as a TACDEV and TORPEX event. Operate a submarine and torpedo tracking range for approximately 14 days, conduct diver recovery of EXTORPs trapped under-ice, helicopter recover to Ice Camp, backhaul and conduct end or run analysis with on-ice support, return airlift EXTORPs from the Ice Camp back to shore for flushing and return ground transport from Alaska back to Naval Undersea Warfare Center (NUWC), Newport, RI. Support Arctic deployments, including inter-Fleet transfers, as required by the SUBFOR Commanders. Investigate, research, develop and deploy new systems for Arctic submarine support. Support testing and tactical development required to improve submarine Arctic operability and warfighting. | | | | | |
| ***FY 2019 Base Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603562N / *Submarine Tactical Warfare Sys* | **Project (Number/Name)**<br>1739 / *Submarine Arctic W/F Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Conduct Arctic work-up training. Support Arctic deployments, including inter-Fleet transfers, as required by the SUBFOR Commanders. Investigate, research, develop and deploy new systems for Arctic submarine support. Conduct Arctic operations to support ice camp equipment evaluation, systems development, and extreme cold weather training, and also perform drifting sea ice analysis required to improve drifting sea ice camp Arctic operations. Support testing and tactical development required to improve submarine Arctic operability and warfighting. Initiate planning, logistics support, procurement, and preparation for ICEX mission 2020 and Ice Camp 2020.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>The FY 2019 decrease is due to the completion of the major TORPEX/TACDEV event in FY 2018. ICEX is conducted on a biennial basis with the off year used to initiate planning, logistics support, procurement, and preparation for the following year's ICEX mission. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 4.184 | 9.679 | 5.067 | 0.000 | 5.067 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

- Use NAVSEA University Affiliated Research Center (UARC) omnibus contract for procurement of an acoustic tracking range service and equipment to support ICEX Ice Camps.
- Use sole source and competitively awarded contracts through the U.S. Army Corps of Engineers (USACE) Alaska regional office for ICEX Ice Camp logistics, engineering, and operations support.
- Use sole source and competitively awarded contracts through the Fleet Logistics Center (FLC) regional contracting office and Defense Logistics Agency (DLA) for equipment procurement and technical services.

**E. Performance Metrics**

Conduct and support Arctic deployments, including inter-Fleet transfers and biennial ICEXs, as required by the SUBFOR Commanders.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603562N / *Submarine Tactical Warfare Sys* | **Project (Number/Name)**<br>1739 / *Submarine Arctic W/F Development* |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Developmental Test & Evaluation | WR | COMSUBLANT : VA | 2.563 | 2.694 | Oct 2016 | 4.107 | Oct 2017 | 2.856 | Oct 2018 | - | | 2.856 | Continuing | Continuing | Continuing |
| Developmental Test & Evaluation | WR | COMSUBPAC : CA | 36.101 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 36.101 | - |
| Developmental Test & Evaluation | WR | NUWC/Newport : RI | 0.235 | 0.000 | | 1.570 | Oct 2017 | 0.000 | | - | | 0.000 | 0.000 | 1.805 | - |
| Developmental Test & Evaluation | C/CPFF | UT/ARL : TX | 1.394 | 0.040 | Jul 2017 | 0.000 | | 0.050 | Dec 2018 | - | | 0.050 | 0.000 | 1.484 | Continuing |
| Developmental Test & Evaluation | MIPR | USACE : AK | 0.000 | 0.852 | Dec 2016 | 1.198 | Dec 2017 | 1.358 | Dec 2018 | - | | 1.358 | 0.000 | 3.408 | - |
| Developmental Test & Evaluation | MIPR | USTRANSCOM : IL | 0.000 | 0.110 | Jan 2017 | 2.100 | Dec 2017 | 0.247 | Dec 2018 | - | | 0.247 | 0.000 | 2.457 | - |
| Developmental Test & Evaluation | C/CPFF | UW/APL : WA | 14.755 | 0.428 | Jul 2017 | 0.644 | Dec 2017 | 0.496 | Dec 2018 | - | | 0.496 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 55.048 | 4.124 | | 9.619 | | 5.007 | | - | | 5.007 | Continuing | Continuing | N/A |

**Management Services ($ in Millions)**

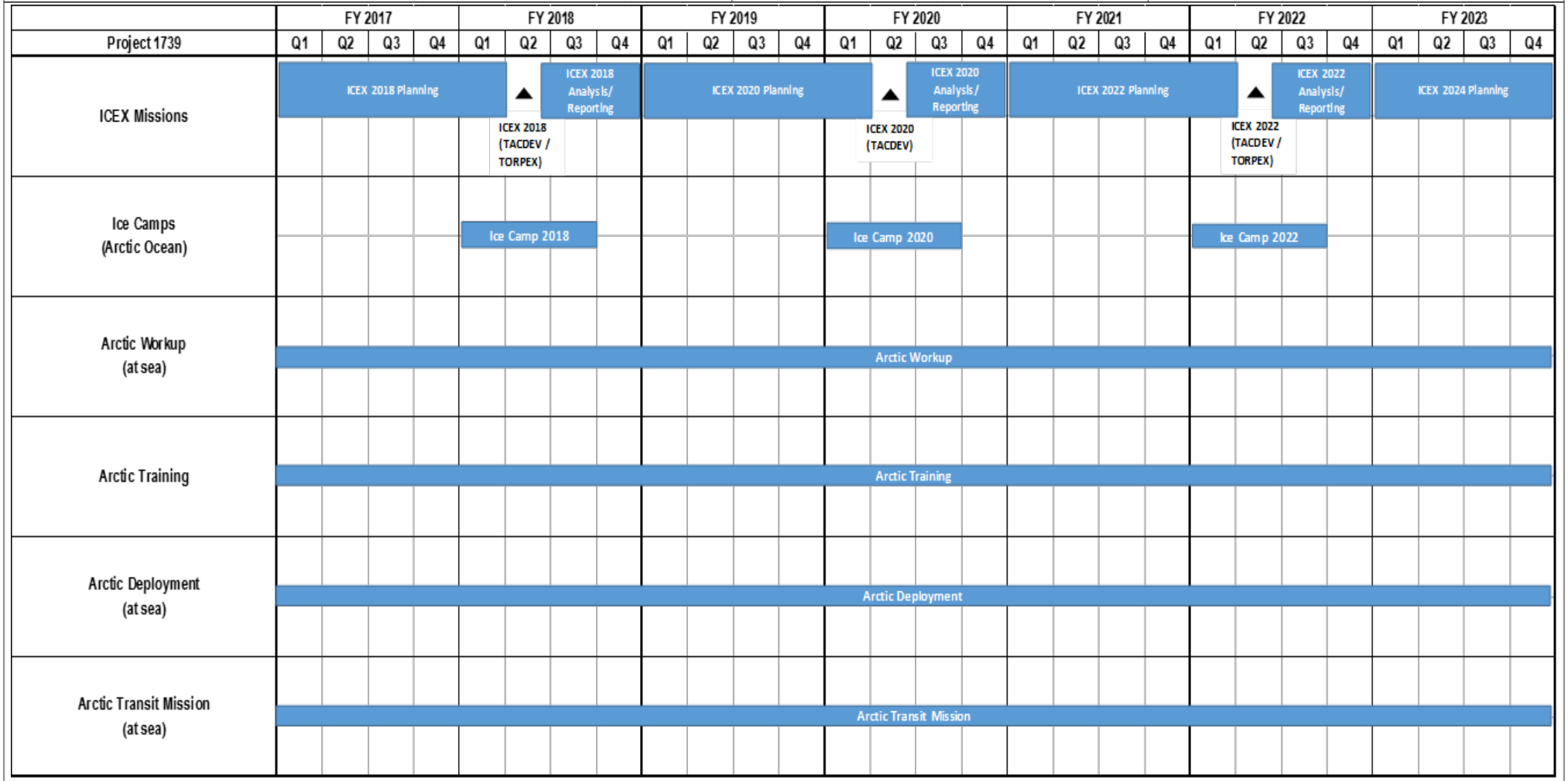
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management Support | C/CPAF | EG&G : VA | 0.311 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.311 | - |
| Program Management Support | C/CPAF | BAE SYSTEMS : MD | 1.088 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.088 | - |
| Program Management Support | C/CPIF | TMB : DC | 0.060 | 0.060 | May 2017 | 0.060 | Feb 2018 | 0.060 | Dec 2018 | - | | 0.060 | Continuing | Continuing | Continuing |
| Travel | Allot | NAVSEA PEO IWS 5 : DC | 0.040 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.040 | - |
| | | **Subtotal** | 1.499 | 0.060 | | 0.060 | | 0.060 | | - | | 0.060 | Continuing | Continuing | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603562N / *Submarine Tactical Warfare Sys* | Project (Number/Name)<br>1739 / *Submarine Arctic W/F Development* | |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 56.547 | 4.184 | | 9.679 | | 5.067 | | - | | 5.067 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603562N / *Submarine Tactical Warfare Sys* | **Project (Number/Name)**<br>1739 / *Submarine Arctic W/F Development* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603562N / *Submarine Tactical Warfare Sys* | **Project (Number/Name)**<br>1739 / *Submarine Arctic W/F Development* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 1739*** | | | | |
| ICEX Missions: ICEX Mission 2018 (TACDEV / TORPEX) Planning/Logistics | 1 | 2017 | 1 | 2018 |
| ICEX Missions: ICEX Mission 2018 (TACDEV / TORPEX) | 2 | 2018 | 2 | 2018 |
| ICEX Missions: ICEX Mission 2018 (TACDEV / TORPEX) Post-ICEX Analysis/ Reporting | 3 | 2018 | 4 | 2018 |
| ICEX Missions: ICEX Mission 2020 (TACDEV) Planning/Logistics | 1 | 2019 | 1 | 2020 |
| ICEX Missions: ICEX Mission 2020 (TACDEV) | 2 | 2020 | 2 | 2020 |
| ICEX Missions: ICEX Mission 2020 (TACDEV) Post-ICEX Analysis/Reporting | 3 | 2020 | 4 | 2020 |
| ICEX Missions: ICEX Mission 2022 (TACDEV / TORPEX) Planning/Logistics | 1 | 2021 | 1 | 2022 |
| ICEX Missions: ICEX Mission 2022 (TACDEV / TORPEX) | 2 | 2022 | 2 | 2022 |
| ICEX Missions: ICEX Mission 2022 (TACDEV / TORPEX) Post-ICEX Analysis/ Reporting | 3 | 2022 | 4 | 2022 |
| ICEX Missions: ICEX Mission 2024 (TACDEV) Planning/Logistics | 1 | 2023 | 4 | 2023 |
| Ice Camps (Arctic Ocean): Ice Camp (Arctic Ocean) 2018 | 1 | 2018 | 3 | 2018 |
| Ice Camps (Arctic Ocean): Ice Camp (Arctic Ocean) 2020 | 1 | 2020 | 3 | 2020 |
| Ice Camps (Arctic Ocean): Ice Camp (Arctic Ocean) 2022 | 1 | 2022 | 3 | 2022 |
| Arctic Workup (At Sea): Arctic Workup (At Sea) | 1 | 2017 | 4 | 2023 |
| Arctic Training: Arctic Training | 1 | 2017 | 4 | 2023 |
| Arctic Deployment (At Sea): Submarine Deployment as required by the Submarine Type Commander | 1 | 2017 | 4 | 2023 |
| Arctic Transit Mission (At Sea): Arctic Transit Mission (At Sea) | 1 | 2017 | 4 | 2023 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603563N *I Ship Concept Advanced Design* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 190.596 | 14.359 | 36.891 | 89.419 | - | 89.419 | 82.387 | 55.459 | 24.400 | 26.204 | Continuing | Continuing |
| 2196: *Design, Tools, Plans and Concepts* | 2.347 | 0.432 | 23.309 | 37.267 | - | 37.267 | 35.230 | 21.989 | 0.683 | 0.765 | Continuing | Continuing |
| 3161: *NAVSEA Tech Authority* | 182.656 | 9.774 | 13.582 | 27.817 | - | 27.817 | 33.153 | 19.343 | 17.467 | 19.062 | Continuing | Continuing |
| 3376: *Strategic Sealift* | 5.593 | 4.153 | 0.000 | 6.335 | - | 6.335 | 6.004 | 6.127 | 6.250 | 6.377 | Continuing | Continuing |
| 4037: *Common Hull Auxiliary Multi-Mission Platform (CHAMP)* | 0.000 | 0.000 | 0.000 | 18.000 | - | 18.000 | 8.000 | 8.000 | 0.000 | 0.000 | 0.000 | 34.000 |

**A. Mission Description and Budget Item Justification**

The FY 2019 funding request was reduced by $1.000 million to account for the availability of prior year execution balances.

Explore alternative surface and expeditionary ship force structures (encompassing amphibious warfare), advanced surface ship and unmanned surface vehicles concepts, and new and emerging technical architectures and solutions in support of pre-acquisition mission needs analysis, mission area analysis and planning, and systems engineering. The objective is a more affordable, mission capable surface ship force including increased ship production capability; ships with reduced manning, reduced operating and support costs, and greater utilization of the latest technology. The program directly supports the Navy Shipbuilding Plan and NAVSEA Technical Authority with state-of-the-art design tools and methods that develop technical options and requirements for surface ship force structure, ship & unmanned vehicle concepts, advanced material and manufacturing efforts, and improved engineering prototypes and solutions for ships that may become part of the shipbuilding plan.

Project 2196 - This project supports the next step in the development of a transformed naval force by accomplishing Pre Milestone A (especially pre-concept) decision efforts for all potential surface ships, specifically future surface combatants and unmanned surface vehicles supporting the Future Surface Combatant (FSC) Analysis of Alternatives (AoA). These efforts are the required first step in the definition and integration of total ship systems, including combat systems, weapons systems and Hull, Mechanical and Electrical (HM&E) systems. This project funds concept development engineering, mission effectiveness analysis, and other analyses for formulation of future surface ship force structure along with development of the tools to accomplish these efforts. Efforts include advanced ship concept studies, ship and ship systems technology assessments, and the development and upgrade of ship concept design and engineering tools, methods and criteria.

Project 3161 - This project is the only R&D effort that provides a coordinated approach to the development of cross platform ship and weapon system designs and technologies 'common' to multiple ships and systems. This project directly informs technical standards for design, construction, certification and operation and provides an avenue for innovative solutions and technologies to compete with legacy product requirements and specifications. This project conducts risk reduction of alternative technical architectures, designs and technology solutions that meet Fleet operational and technical requirements at lower cost, and develops engineering capabilities in the areas of design tools, criteria and methods. This project funds a prioritized portfolio of time-sensitive initiatives through the Cross Platform Systems Development (CPSD) program, supporting NAVSEA Technical Authority and associated risk reduction activity. The areas of exploration for CPSD include Ship Technology Improvements, Fleet Maintenance and Life Cycle Cost Reduction, Advanced Manufacturing and Material Technology, Digital Framework/Electromagnetic

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603563N *I Ship Concept Advanced Design* |

Environment and Development and Unmanned Systems and Cyber security. The research products developed by this project directly support and influence both in-service fleet requirements and future acquisition programs by providing a range of technically acceptable alternatives and evaluation of emerging technologies. The prototypes, standards/specs, tools and processes and other products developed in this project focus on technical requirements and technologies applicable to multiple ship classes or systems. Products from this project transition directly to early-stage ship design for Ship Preliminary Design and Feasibility Studies, Program Executive Office (PEO) ship acquisition programs, and Systems Engineering Technical Authority (SETA) requirements documentation. Tasks within this project include R&D efforts focused on increasing sustainment technologies and improving performance at reduced cost for current and future naval platforms.

Project 3376 - Strategic Sealift Research and Development - Develops new concepts and technologies which can be applied to or will enable future strategic sealift, and Seabasing systems. The technologies include ship configuration concepts, equipment to increase cargo handling and cargo loading/unloading rates (including commercial and merchant ship systems), improved man/machine interfaces, improved structural configurations and materials, and Logistics-Over-the-Shore (LOTS) equipment and system improvements. FY2018, FY2016, and prior years efforts were funded under the National Defense Sealift Fund (NDSF) BA 04 Project 3116 Strategic Sealift Research and Development.

Project 4037 - This project supports Common Hull Auxiliary Multi-Mission Platform (CHAMP)Design and Total Ship Integration. The CHAMP concept leverages a new approach to requirements generation and shipbuilding to replace aging mission specific designs with a common hull to reduce life cycle costs, leverage tailored payloads, and stabilize the industrial base. Identified missions include: sealift, aviation intermediate maintenance support, medical services, command & control, and submarine tending. Funding will inform requirements definition, early industry engagement and follow-on assessment across CHAMP mission functionality.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 14.590 | 36.891 | 47.662 | - | 47.662 |
| Current President's Budget | 14.359 | 36.891 | 89.419 | - | 89.419 |
| Total Adjustments | -0.231 | 0.000 | 41.757 | - | 41.757 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -0.211 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | 43.054 | - | 43.054 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -1.297 | - | -1.297 |
| • Congressional General Reductions Adjustments | -0.020 | - | - | - | - |

**Change Summary Explanation**

Proj: 3161 NAVSEA Tech Authority

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603563N *I Ship Concept Advanced Design* |

Increase = $13.000 million - funds added for comprehensive set of cyber warfighting capabilities to meet existing Fleet cybersecurity gaps, added distributed cyber test capability, cyber test and assessment capability and cybersecurity T&E policy, directives and requirements.

Increase = $6.700 million - funds additive manufacturing to provide increased Fleet readiness and improve warfighting capacity by enabling production at or near the point of need.

Decrease = -$1.000 million - The FY 2019 funding request was reduced by $1.000 million to account for the availability of prior year execution balances.

Proj: 3376 Strategic Sealift
Increase = $6.335 million - National Defense Sealift Fund (NDSF) disestablished transferring funds into RDTEN.

Proj: 4037 Common Hull Auxiliary Multi-Mission Platform (CHAMP)
Increase = $18.000 million - funds new program to start early industry studies for a replacement to several ship classes for CHAMP Design and Total Ship Integration efforts.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603563N / *Ship Concept Advanced Design* | Project (Number/Name)<br>2196 / *Design, Tools, Plans and Concepts* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2196: *Design, Tools, Plans and Concepts* | 2.347 | 0.432 | 23.309 | 37.267 | - | 37.267 | 35.230 | 21.989 | 0.683 | 0.765 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

This project provides the foundation for an affordable and mission capable surface ship force. It also supports the next step in the development of a transformed naval force by accomplishing the pre-milestone A (especially pre-concept decision) efforts for all potential surface ships. These efforts are the required first step in the integration of total ship systems, including combat systems, weapons systems and Hull, Mechanical and Electrical (HM&E) systems. Inadequate early planning and ship concept formulation can result in down-stream design, construction and operational problems. A more subtle and severely negative impact of neglecting this early effort is that the "best" concepts and technologies may never even be considered and the greatest potential ship design advances never realized. Designs and technologies must consider how to meet the threat. This project supports this requirement.

This project funds concept development engineering, mission effectiveness analysis, and other analyses for formulation of future surface ship force structure along with development of the tools to accomplish these efforts. Advanced ship concept studies, ship and ship systems technology assessments, and the development and upgrade of ship concept design and engineering tools, methods, and criteria are also funded in this project.

This project:

(1) Develops alternative surface ship force structure concepts including the ships and unmanned vehicles.
(2) Evaluates the mission capability effectiveness and costs for these alternative surface fleet architectures.
(3) Performs fleet war fighting/mission effectiveness assessment studies.
(4) Identifies future surface ship requirements and characteristics necessary to meet future threats and support mission needs.
(5) Investigates new affordable ship concepts and evaluates technologies necessary to support these concepts.
(6) Provides design methods and automated design tools to develop and evaluate ship concepts.
(7) Supports development of Initial Capabilities Documents (ICD) and analogous early requirements documents for future ships.

These efforts are done to support analysis; mission needs development and technology assessment in support of future fleet concepts and potential ship acquisition programs. These efforts are fundamental to the Navy's formulation of the future fleet requirements.

These efforts supports and maintains naval ship design and engineering capabilities in the design phase of developing concept design tools, criteria and methods.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>2196 / *Design, Tools, Plans and Concepts* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Ship Concepts and Mission Need Analysis | 0.432 | 0.452 | 0.473 | 0.000 | 0.473 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Develop ship concepts and perform analysis for potential ships and Force Architecture 10-30 years out in shipbuilding plan.<br><br>***FY 2018 Plans:***<br>Develop engineering tools, methods, and criteria used for ship designs. Advance methodologies and tools for expediting ship design.<br><br>***FY 2019 Base Plans:***<br>Evaluate multi-mission effectiveness and costs, and develop ship concept designs.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Minor adjustments from FY18 to FY19. | | | | | |
| ***Title:*** Future Surface Combatant Studies | 0.000 | 22.857 | 36.794 | 0.000 | 36.794 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** This effort will lay the analytic foundation for the development of the Future Surface Combatant (FSC) post Capabilities Based Assessment. Ships produced from this effort will fill critical gaps in the fleet in the 2030 timeframe created by the decommisioning of CG 47, DDG 51, and LCS 1/2 ships. Unmanned vehicle efforts will expand conops to decouple mission capability from manned force structure.<br><br>***FY 2018 Plans:***<br>Conduct ship design and unmanned vehicle studies to support analytic foundation for the development of a Future Surface Combatant post Capabilities Based Assessment (CBA).<br><br>Develop FSCs and associated unmanned surface vehicles including mission payloads, sensors and handling systems.<br><br>Define technical requirements for: modular unmanned system mission payloads, common control systems, launch & recovery (L&R) system concepts | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>2196 / *Design, Tools, Plans and Concepts* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Develop technical requirements and standards for unmanned system autonomous operations, define host ship technical requirements and interface standards<br>***FY 2019 Base Plans:***<br>The support necessary to support a Request For Proposal (RFP) for Preliminary Design by FY20 requires a significant increase in human capital (both government and contractor) to perform the requisite studies and analyses necessary to develop, finalize and evaluate system and mission requirements; and develop Milestone-documentation in support of Preliminary Design. Funding will also be used to continue to conduct ship design and unmanned vehicle studies to support analytic foundation for the development of a Future Surface CBA. Develop FSCs and associated unmanned surface vehicles including mission payloads, sensors and handling systems. Define technical requirements for: modular unmanned system mission payloads, common control systems, L&R system concepts.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>In FY19, an additional $13.937M is required to complete full Analysis of Alternatives for Future Surface Combatant to support a Request For Proposal (RFP) for Preliminary Design by FY20. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.432 | 23.309 | 37.267 | 0.000 | 37.267 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • RDTEN/0204202N: *DDG-1000* | 45.187 | 140.500 | 161.264 | - | 161.264 | 132.337 | 133.781 | 88.573 | 16.617 | Continuing | Continuing |
| • RDTEN/0603512N: *Carrier Systems Development* | 7.516 | 9.296 | 5.440 | - | 5.440 | 5.401 | 5.531 | 5.637 | 5.778 | Continuing | Continuing |
| • RDTEN/0603564N: *Ship Preliminary Design/Feasibility* | 13.451 | 12.012 | 13.348 | - | 13.348 | 22.534 | 9.320 | 9.494 | 9.687 | Continuing | Continuing |
| • RDTEN/0604567N: *Ship Contract Design/Live Fire T&E* | 82.946 | 67.166 | 60.062 | - | 60.062 | 59.688 | 54.596 | 55.677 | 56.859 | Continuing | Continuing |
| • RDTEN/0603582N: *Combat System Integration* | 23.839 | 24.674 | 16.351 | - | 16.351 | 27.921 | 16.015 | 15.509 | 26.496 | Continuing | Continuing |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>2196 / *Design, Tools, Plans and Concepts* |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|

**Remarks**

**D. Acquisition Strategy**

This is a non-acquisition program that develops, evaluates, and validates early stages of total ship concepts and technologies in support of SCN planning and potential future ship acquisition programs. This program also supports development, demonstration, evaluation, and validation of engineering tools, methods, and criteria for those concept designs and assessments.

**E. Performance Metrics**

Quarterly Program Reviews

Monthly Reviews

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603563N / *Ship Concept Advanced Design* | Project (Number/Name)<br>2196 / *Design, Tools, Plans and Concepts* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Systems Engineering | C/CPFF | Various Contractors : Various | 0.584 | 0.000 | | 0.715 | Feb 2018 | 4.000 | Feb 2019 | - | | 4.000 | Continuing | Continuing | Continuing |
| Systems Engineering | WR | NSWC : Various | 0.906 | 0.000 | | 1.375 | Feb 2018 | 1.000 | Feb 2019 | - | | 1.000 | Continuing | Continuing | Continuing |
| Systems Engineering | WR | NSWC DD : Dahlgren, VA | 0.000 | 0.000 | | 5.500 | Nov 2017 | 2.250 | Nov 2018 | - | | 2.250 | Continuing | Continuing | Continuing |
| Systems Engineering | WR | NSWC PL : Philadelphia, PA | 0.000 | 0.000 | | 3.125 | Nov 2017 | 2.750 | Nov 2018 | - | | 2.750 | Continuing | Continuing | Continuing |
| Systems Engineering | WR | SPAWAR : San Diego, CA | 0.000 | 0.000 | | 1.375 | Nov 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Systems Engineering | WR | JHU APL : Baltimore, MD | 0.000 | 0.000 | | 3.219 | Feb 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Systems Engineering | WR | NSWC CD : Carderock, MD | 0.000 | 0.000 | | 0.000 | | 4.000 | Oct 2018 | - | | 4.000 | Continuing | Continuing | Continuing |
| Engineering Development | C/CPFF | Various Contractors : Various | 0.171 | 0.000 | | 0.000 | | 7.127 | Feb 2019 | - | | 7.127 | Continuing | Continuing | Continuing |
| Engineering Development | WR | NSWC CD : Carderock, MD | 0.637 | 0.432 | Jan 2017 | 8.000 | May 2018 | 6.460 | Nov 2018 | - | | 6.460 | Continuing | Continuing | Continuing |
| Engineering Development | C/BA | NSWC : Various | 0.000 | 0.000 | | 0.000 | | 1.610 | Feb 2019 | - | | 1.610 | Continuing | Continuing | Continuing |
| Demonstration & Evaluation | C/CPFF | Various Contractors : Various | 0.029 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Test & Evaluation | C/CPFF | Various Contractors : Various | 0.020 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Engineering Development | WR | NSWC PL : Philadelphia, PA | 0.000 | 0.000 | | 0.000 | | 4.440 | Nov 2018 | - | | 4.440 | 0.000 | 4.440 | - |
| Engineering Development | WR | NSWC DD : Dahlgren, VA | 0.000 | 0.000 | | 0.000 | | 3.630 | Nov 2018 | - | | 3.630 | 0.000 | 3.630 | - |
| | | **Subtotal** | 2.347 | 0.432 | | 23.309 | | 37.267 | | - | | 37.267 | Continuing | Continuing | N/A |

**Remarks**

Significant increases for Systems Engineering and Engineering Development tasking with both contractor and Navy Warfare Center activities stems from requirement to complete full Analysis of Alternatives to support and issue a Request For Proposal for Preliminary Design by FY20.

This funding is essential to:

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>2196 / *Design, Tools, Plans and Concepts* |

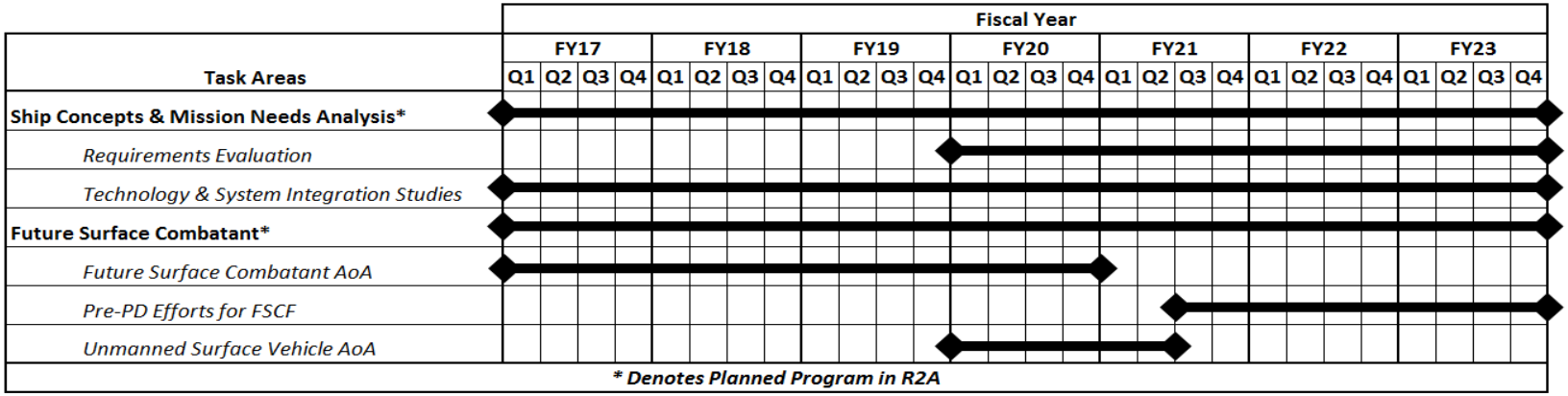
**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - Ensure participation in AoA/requirements development teams to examine the alternative concepts and feasibility of acquisition strategies<br>- Prepare required documents for Alternative Systems Reviews (ASR) after the AoA and Navy determines preferred material solution(s)<br>- Perform operational & technical analysis on preferred material solutions<br>- Establish program framework and strategies<br>- Prepare required Milestone A documents for preferred material solution(s)<br>- Develop technology development strategy | | | | | | | | | | | | | | | |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 2.347 | 0.432 | | 23.309 | | 37.267 | | - | | 37.267 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>2196 / *Design, Tools, Plans and Concepts* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>2196 / *Design, Tools, Plans and Concepts* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 2196*** | | | | |
| Ship Concepts and Mission Needs Analysis | 1 | 2017 | 4 | 2023 |
| Requirements Evaluation | 1 | 2020 | 4 | 2023 |
| Technology & System Integration Studies | 1 | 2017 | 4 | 2023 |
| Future Surface Combatant | 1 | 2017 | 4 | 2023 |
| Pre-Preliminary Design Efforts for Future Surface Combatant Force | 1 | 2021 | 4 | 2023 |
| Unmanned Surface Vehicle AoA | 1 | 2020 | 4 | 2021 |
| Future Surface Combatant AoA | 1 | 2017 | 4 | 2020 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603563N / *Ship Concept Advanced Design* | Project (Number/Name)<br>3161 / *NAVSEA Tech Authority* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3161: *NAVSEA Tech Authority* | 182.656 | 9.774 | 13.582 | 27.817 | - | 27.817 | 33.153 | 19.343 | 17.467 | 19.062 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

All Cross Platform System Development (CPSD) Pillars have been rebaselined in FY19 to better address CNO and NAVSEA Chief Engineer (SEA05) technical priorities. FY18 Pillars remain as requested in PRESBUD.

**A. Mission Description and Budget Item Justification**

This project has been established to support the NAVSEA Tech Authority with the coordination of design and development efforts for cross-platform applicability to result in more affordable, mission-capable, and interoperable surface ship forces including ships that are less expensive to build and operate with reduced manning, reduced support costs, and greater utilization of emerging technology.

NAVSEA Tech Authority efforts under Project 3161, known as the Cross Platform Systems Development (CPSD) Program transition directly to early-stage ship design for Ship Preliminary Design and Feasibility Studies and other Program Executive Office (PEO) ship design programs. While these efforts support concept exploration and mission needs assessment for potential future ship acquisition programs, they also develop cross-program technology solutions and associated technical authority products. They are not direct efforts for specific, authorized shipbuilding programs. This project is the only R&D effort that provides a coordinated, collaborative approach to the development of: cross-platform naval ship and weapon system design, as well as engineering capabilities in the areas of design tools, criteria, and methods. This project also provides innovative solutions for current Fleet issues involving Technical Authority, such as interoperability issues with new systems or platforms, or broad technology insertion topics.

In FY18, the CPSD program was rebaselined to account for a decreasing budget to the following functional areas:

CPSD 1.0 - Platform Concept Advanced Development
CPSD 2.0 - Platform Design and Certification Tools/Engineering and Tech Data Exchange Development
CPSD 3.0 - Ship Systems Engineering/Modular Ship Systems Development
CPSD 5.0 - High Speed Ships and Craft Engineering
CPSD 6.0 - Alternate Power Systems Engineering
CPSD 8.0 - Embedded Interoperability (I/O) Engineering
CPSD 9.0 - Mission Capability Systems Engineering
CPSD 13.0 - Cybersecurity
CPSD 14.0 - Future Surface Combatant Study

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>3161 / *NAVSEA Tech Authority* |

In FY19, all CPSD Pillars have been rebaselined again to better address CNO and NAVSEA Chief Engineer (SEA05) technical priorities and shall be comprised of the following functional areas:

CPSD A - Ship Technology Improvements
CPSD B - Fleet Maintenance and Life Cycle Cost Reduction
CPSD C - Additive and Advanced Manufacturing Technology
CPSD D - Digital Framework/Electromagnetic Environment and Development
CPSD E - Unmanned Systems
CPSD F - Cybersecurity

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Platform Concept Advanced Development (CPSD 1.0) | 0.158 | 0.000 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** This effort directly supports the Navy's ability to understand risk and associated cost of surface and expeditionary warfare assets; Unmanned Surface Vehicle (USV) design and analysis.<br><br>***FY 2018 Plans:***<br>N/A.<br><br>OCO:<br>N/A.<br><br>***FY 2019 Base Plans:***<br>N/A<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>In FY19, the work accomplished under this pillar will be rolled into pillar CPSD E - Unmanned Systems. | | | | | |
| ***Title:*** Platform Design and Certification Tools/Engineering and Tech Data Exchange (CPSD 2.0) | 0.244 | 1.313 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** This effort supports the development of validation tools to certify the safety and mission capability of platform concepts and subsequently ships; establishes the integrated NAVSEA suite; and advances design methods, validation tools, and manpower tools to aid in rapid total platform definition and assessment. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>3161 / *NAVSEA Tech Authority* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***FY 2018 Plans:***<br>Develop additional analytical capabilities (i.e. tools to simulate various sea states and ship motions). Additionally, preliminary design specifications must be developed to establish material selection criteria.<br><br>Support the development of validation tools to certify the safety and mission capability of platform concepts. This effort advances platform design methods, design validation tools, manpower tools and tools to aid in rapid total platform definition.<br><br>OCO:<br>N/A.<br>***FY 2019 Base Plans:***<br>N/A<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>In FY19, the work accomplished under this pillar has been transitioned into pillar CPSD A - Ship Technology Improvements. | | | | | |
| ***Title:*** Ship Systems Engineering /Modular Ship Systems Development (CPSD 3.0)<br>***Articles:***<br><br>***Description:*** This effort supports Ship system development with a focus on technology transition, modularity and ship system technology integration to support ongoing ship modernization.<br><br>***FY 2018 Plans:***<br>Continue to analyze the logistical and engineering aspects of the application of 3D modeling and printing technology in metals and powders. Continue assessment of technology solutions for aluminum cracking.<br><br>OCO:<br>N/A.<br>***FY 2019 Base Plans:*** | 1.742<br>- | 2.173<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>3161 / *NAVSEA Tech Authority* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>In FY19, the work accomplished under this pillar has been transitioned into pillar CPSD C - Additive and Advanced Manufacturing Technology. | | | | | |
| ***Title:*** High Speed Ships and Craft Engineering (CPSD 5.0)<br>***Articles:***<br>***Description:*** This effort supports the development of concepts for future high speed ships that promise improved mission effectiveness in mobility, survivability and warfare mission areas.<br>***FY 2018 Plans:***<br>N/A.<br>OCO:<br>N/A.<br>***FY 2019 Base Plans:***<br>N/A<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>In FY19, the work accomplished under this pillar will be rolled into pillar CPSD A - Ship Technology Improvements. | 0.204<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- |
| ***Title:*** Alternative Power Systems Engineering (CPSD 6.0)<br>***Articles:***<br>***Description:*** This effort investigates concepts for ships with alternative HM&E/power/propulsion systems evaluating effectiveness in mobility, survivability, hull, mechanical/electrical and in traditional and evolving warfare mission areas. | 0.158<br>- | 0.500<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>3161 / *NAVSEA Tech Authority* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***FY 2018 Plans:***<br>Investigate trimaran ship component model data to support the Project Agreement with Japan.<br><br>OCO:<br>N/A.<br>***FY 2019 Base Plans:***<br>N/A<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>In FY19, the work accomplished under this pillar has been transitioned into pillar CPSD D - Digital Framework/ Electromagnetic Environment and Development. | | | | | |
| ***Title:*** Embedded Interoperability (I/O) Engineering (CPSD 8.0)<br>***Articles:***<br><br>***Description:*** This effort establishes and executes a dedicated process for evaluating the interoperability performance of<br>warfare systems early in the acquisition cycle, prior to certification. Embedded I/O ensures that fewer mission critical<br>system failures degrade the ultimately fielded war fighting capability. Focus on emerging Open Architecture warfare<br>systems, including LCS Class.<br><br>***FY 2018 Plans:***<br>N/A.<br><br>OCO:<br>N/A.<br>***FY 2019 Base Plans:***<br>N/A<br>***FY 2019 OCO Plans:*** | 0.084<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>3161 / *NAVSEA Tech Authority* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>In FY19, the work accomplished under this pillar will be rolled into pillar CPSD B - Fleet Maintenance and Life Cycle Cost Reduction. | | | | | |
| ***Title:*** Mission Capability Systems Engineering (CPSD 9.0)<br>***Articles:***<br><br>***Description:*** This effort supports the development of force-level systems engineering criteria and guidance at the Systems of Systems (SoS) and Family of Systems (FoS) level. This effort allows for the enhanced warfighter and system performance with reduced personnel costs with project costs savings.<br><br>***FY 2018 Plans:***<br>Funds development of an overarching open architecture concept that couples hull, mechanical and electrical (HM&E) systems to develop a "system of systems". The concept of open architecture must be implemented in the design of the future surface fleet to ensure cross platform and multi-mission capability. The concept of modularity will allow the Navy to have greater flexibility which decreases program costs (do more with less).<br><br>Validate required mission performance against fully functional and degraded array conditions.<br><br>OCO:<br>N/A.<br><br>***FY 2019 Base Plans:***<br>N/A<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>In FY19, the work accomplished under this pillar has been transitioned into pillar CPSD B - Fleet Maintenance and Life Cycle Cost Reduction. | 0.368<br>- | 1.500<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- |
| ***Title:*** Cybersecurity (CPSD 13.0)<br>***Articles:*** | 4.816<br>- | 8.096<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>3161 / *NAVSEA Tech Authority* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Description:*** This supports the research, design, development and testing of cybersecurity solutions for shipboard Hull Mechanical and Electrical (HM&E) , Navigation Systems, Combat Systems, and other shipboard control systems. It also supports the development of specifications and standards for the cybersecurity of all Navy Control Systems (NCS).<br><br>***FY 2018 Plans:***<br>Develop, implement, and operate a whole ship system of systems cyber test bed (USS SECURE). There is urgent need to secure Navy control systems and there is also insufficient production ready applications available that meet Navy requirements. In order to have a common cybersecurity solution adopted, it is essential that the tools and testing capabilities be available quickly. The additional funds will significantly accelerate development of deployable capabilities.<br><br>Continue to research, develop, and mature various cross-platform cybersecurity solutions including but not limited to: situational awareness tools, boundary defense capabilities, cyber security optimized network design, network reconnaissance and discovery, and operational indifference to malicious intent. Continue spiral development and test and evaluation of cybersecurity technologies in shipboard environment. Continue to mature capability for Destroyer Fleet and Carriers and expand capability to Amphibious Fleet. Continue development of specifications and standards for Cybersecurity of NCS.<br><br>OCO:<br>N/A.<br><br>***FY 2019 Base Plans:***<br>N/A<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>In FY19, the work accomplished under this pillar has been transitioned into pillar CPSD F - Cybersecurity.<br>. | | | | | |
| ***Title:*** Future Surface Combatant Studies (CPSD 14.0) | 2.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |

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|---|---|---|
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| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Description:*** This effort will lay the analytic foundation for the development of the Future Surface Combatant (FSC) post Capabilities Based Assessment. Ships produced from this effort will fill critical gaps in the fleet in the 2030 timeframe created by the decommisioning of CG 47, DDG 51, and LCS 1/2 ships. Unmanned vehicle efforts will expand conops to decouple mission capability from manned force structure.<br><br>***FY 2018 Plans:***<br>The FSC studies project moves to PU 2196 in FY18.<br><br>***FY 2019 Base Plans:***<br>N/A<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>N/A | | | | | |
| ***Title:*** Cybersecurity (CPSD F)<br>***Articles:*** | 0.000<br>- | 0.000<br>- | 16.739<br>- | 0.000<br>- | 16.739<br>- |
| ***Description:*** Description: This supports the research, design, development and testing of Cybersecurity solutions for shipboard Hull Mechanical and Electrical (HM&E), Navigation Systems, Combat Systems, and other shipboard control systems. It also supports the development of specifications and standards for the Cybersecurity of all Navy Control Systems (NCS). This pillar was created for FY19 and follow-on years and includes FY18 pillars CPSD 13.0.<br><br>***FY 2018 Plans:***<br>N/A<br><br>***FY 2019 Base Plans:***<br>Efforts will concentrate on ensuring the stability and supportability of hardware and software to be deployed operationally. Long term ownership and maintenance of capabilities will be established. Since cybersecurity is a constantly evolving environment, efforts will continue to research, develop, and mature various cross-platform cybersecurity solutions including but not limited to: situational awareness tools, boundary defense capabilities, cyber security optimized network design, network reconnaissance and discovery, and operational | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>3161 / *NAVSEA Tech Authority* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| indifference to malicious intent. Continue development of specifications and standards for cybersecurity of NCS. Cybersecurity implementation will be expanded to additional classes of ships on a schedule to be determined based on availability.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Increase from FY 18 to FY19 ($8.643M) between CPSD 13.0 ($8.096 million) and CPSD F ($16.739 million) to fund additional work to transition capabilities to a technology readiness level commensurate with deployment, such as testing, documentation, and ship change planning. Long term ownership and maintenance of capabilities will be established. Funding also provides the ability to back fit targeted capabilities for legacy/in service platforms; and allows for the update and management of deployed software/hardware. Funding will also accelerate the development of a distributed Cyber test capability that provides a system of systems cyber test and assessment capability and will provide cyber assessments of systems, systems-of-systems, platforms, strike groups and theater level missions. | | | | | |
| ***Title:*** Ship Technology Improvements (CPSD A)<br>***Articles:***<br>***Description:*** This effort provides for the analysis of ship system technologies to reduce design and construction costs. This also includes the development of validation tools to certify the safety and mission capability of platform concepts and subsequently ships.<br>***FY 2018 Plans:***<br>N/A<br>***FY 2019 Base Plans:***<br>Continue the development of ship construction technology improvements to reduce risk related to alternative technical architectures and designs. Complete support of tri-maran hull configuration performance evaluation.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:*** | 0.000<br>- | 0.000<br>- | 1.340<br>- | 0.000<br>- | 1.340<br>- |

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|---|---|---|
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| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| This pillar was created for FY19 and follow-on years and includes FY18 pillars CPSD 2.0 & 5.0 ($1.313M in FY18). Minor funding increase by inflation adjustment, as selected tasking in FY19 is expected to be commensurate with FY18 tasking. | | | | | |
| ***Title:*** Fleet Maintenance and Life Cycle Cost Reduction (CPSD B)<br>***Articles:***<br><br>***Description:*** This effort funds the development of tools, analyses and technologies to reduce fleet life cycle costs, reduce life-cycle failure risk and improved refurbishment cycles. This will allow the Navy to better meet fleet operational and technical requirements and lower cost.<br><br>***FY 2018 Plans:***<br>N/A.<br><br>***FY 2019 Base Plans:***<br>Develop technologies to reduce in-service costs and technical risk associated with deployed technologies and systems. FY19 shall include a focus on technology improvements to reduce known in-service deficiencies.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>This pillar was created for FY19 and follow-on years and includes FY18 pillars CPSD 8.0 & 9.0 ($1.5M in FY18). Minor funds decrease. | 0.000<br>- | 0.000<br>- | 1.150<br>- | 0.000<br>- | 1.150<br>- |
| ***Title:*** Additive and Advanced Manufacturing Technology (CPSD C)<br>***Articles:***<br><br>***Description:*** This effort funds the development of additive manufacturing technologies, advanced coating techniques, topology optimization and materials characterization and selection. This pillar was created for FY19 and follow-on years and includes FY18 pillars CPSD 3.0.<br><br>***FY 2018 Plans:***<br>N/A<br><br>***FY 2019 Base Plans:***<br>Funding transitioned from FY18 CPSD Pillar 3.0 will be utilized to analyze the logistical and engineering aspects of the application of 3D modeling and additive manufacturing (AM) technology for metal and polymer | 0.000<br>- | 0.000<br>- | 7.360<br>- | 0.000<br>- | 7.360<br>- |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>3161 / *NAVSEA Tech Authority* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| components. Further conduct material characterization and selection efforts for both additively manufactured and conventional materials.<br><br>Additional funding provided in FY19 will be used to accelerate CNO additive manufacturing priorities and aligns them with technical authority requirements and products. Solutions will provide the foundation to increase Fleet readiness and improve warfighting capacity by enabling production at or near the point of need. Specific efforts include development of AM design and manufacturing standards; determining AM equipment performance requirements in dynamic environments (I.e. shipboard); ship integration requirements for AM equipment; and navy-specific AM industrial base requirements including digital file transfer and cyber.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Funding increase from FY18 to FY19 (+$7.360 million) is attributed to the approval of CNO-directed initiative to expedite Additive Manufacturing benefit to the fleet as increased warfighter capability and improved readiness, in addition to transitioning requirements from FY18 CPSD Pillar 3.0 into Functional Area CPSD C. | | | | | |
| ***Title:*** Digital Framework/Electromagnetic Environment and Development (CPSD D)<br>***Articles:***<br>***Description:*** Develop an understanding and address the energy demands of the future fleet including power management and energy harvesting.<br>***FY 2018 Plans:***<br>N/A<br>***FY 2019 Base Plans:***<br>Develop power management and distribution technologies. Complete ship display system testing.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>This pillar was created for FY19 and follow-on years and includes FY18 pillars CPSD 6.0 ($0.500M in FY18). | 0.000<br>- | 0.000<br>- | 0.625<br>- | 0.000<br>- | 0.625<br>- |
| ***Title:*** Unmanned Systems (CPSD E)<br>***Articles:*** | 0.000<br>- | 0.000<br>- | 0.603<br>- | 0.000<br>- | 0.603<br>- |

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|---|---|---|
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| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Description:*** This effort funds the development and advancement of NAVY unmanned systems across various platforms. Note: Unmanned system efforts in years prior to FY19 were captured under CPSD Pillar 1.0.<br><br>***FY 2018 Plans:***<br>N/A<br><br>***FY 2019 Base Plans:***<br>Efforts focus on the development of rapid deployment and swarming technologies (and the deployment of such weapon systems). Swarming technologies require funding to provide weapon system alternatives for both large and small scale unmanned platforms. Perform evaluation of multi-scaled vehicles for deployment from various host vessels.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Minor increase for unmanned systems efforts. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 9.774 | 13.582 | 27.817 | 0.000 | 27.817 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • RDTEN/0204202N: *DDG-1000* | 45.187 | 140.500 | 161.264 | - | 161.264 | 132.337 | 133.781 | 88.573 | 16.617 | Continuing | Continuing |
| • RDTEN/0603512N: *Carrier Systems Development* | 7.516 | 9.296 | 5.440 | - | 5.440 | 5.401 | 5.531 | 5.637 | 5.778 | Continuing | Continuing |
| • RDTEN/0603564N: *Ship Preliminary Design/ Feasibility Studies* | 13.451 | 12.012 | 13.348 | - | 13.348 | 22.534 | 9.320 | 9.494 | 9.687 | Continuing | Continuing |
| • RDTEN/0604567N: *Ship Contract Design/Live Fire T&E* | 82.946 | 67.166 | 60.062 | - | 60.062 | 59.688 | 54.596 | 55.677 | 56.859 | Continuing | Continuing |
| • RDTEN/0603582N: *Combat System Integration* | 23.839 | 24.674 | 16.351 | - | 16.351 | 27.921 | 16.015 | 15.509 | 26.496 | Continuing | Continuing |

**Remarks**

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>3161 / *NAVSEA Tech Authority* |

**D. Acquisition Strategy**

This is a non-acquisition program that develops, evaluates, and validates early stages of total ship concepts and technologies in support of SCN planning and potential future ship acquisition programs. This program also supports development, demonstration, evaluation, and validation of engineering tools, methods, and criteria for those concept designs and assessments. This program provides validated engineering tools, methods, and criteria for ship, and weapon system concept designs and assessments while fostering collaboration and coordination of efforts resulting in more effective use of funding.

**E. Performance Metrics**

Quarterly Program Reviews

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>3161 / *NAVSEA Tech Authority* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Systems Engineering | C/CPFF | Various Contractors : Various | 18.436 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Systems Engineering | WR | NSWC, NUWC, CDSA : Various | 62.829 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Engineering Development | C/CPFF | DRS : Stevensville, MD | 3.249 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Engineering Development | WR | NSWC, NUWC : Various | 53.465 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Demonstration & Evaluation | WR | NSWC : Various | 20.044 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Demonstration & Evaluation | WR | SPAWAR : Various | 1.922 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Test and Evaluation | WR | NSWC : Various | 11.910 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Systems Engineering | WR | NSWC DD : Dahlgren, VA | 0.200 | 0.200 | May 2017 | 0.200 | May 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Systems Engineering | WR | NSWC CD : Carderock, MD | 0.800 | 1.480 | Dec 2016 | 1.000 | Dec 2017 | 1.050 | Dec 2018 | - | | 1.050 | Continuing | Continuing | Continuing |
| Systems Engineering | WR | NSWC PL : Philadelphia, PA | 0.874 | 0.874 | May 2017 | 0.872 | May 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Systems Engineering | WR | NRL : Washington, D.C. | 0.046 | 0.046 | Aug 2017 | 0.046 | Aug 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Systems Engineering | C/CPFF | ALION : Wahington, D.C. | 0.120 | 0.120 | May 2017 | 0.120 | May 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Systems Engineering | C/CPFF | CSC : Washington, D.C. | 0.300 | 0.300 | Jul 2017 | 0.300 | Jul 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Systems Engineering | MIPR | Army Research Lab : Aberdeen Proving Ground, MD | 0.075 | 0.075 | Jul 2017 | 0.075 | Jul 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Engineering Development | WR | NUWC Newport : Newport, RI | 0.132 | 0.132 | Dec 2016 | 0.382 | Dec 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Engineering Development | WR | NUWC Keyport : Keyport, WA | 0.150 | 0.150 | Nov 2016 | 0.150 | Nov 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>3161 / *NAVSEA Tech Authority* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Engineering Development | WR | NSWC Crane : Crane, IN | 0.169 | 0.169 | Dec 2016 | 0.169 | Dec 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Engineering Development | WR | NSWC DD : Dahlgren, VA | 0.425 | 0.425 | May 2017 | 0.800 | May 2018 | 0.500 | Dec 2018 | - | | 0.500 | Continuing | Continuing | Continuing |
| Engineering Development | WR | NSWC CD : Carderock, MD | 1.324 | 0.265 | Dec 2016 | 1.775 | Dec 2017 | 1.278 | Dec 2018 | - | | 1.278 | Continuing | Continuing | Continuing |
| Engineering Development | WR | NSWC PD : Philadelphia, PA | 0.244 | 0.244 | Nov 2016 | 0.294 | Nov 2017 | 0.500 | Nov 2018 | - | | 0.500 | Continuing | Continuing | Continuing |
| Engineering Development | C/CPFF | CSC : Washington, D.C. | 0.100 | 0.100 | Jul 2017 | 0.100 | Jul 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Engineering Development | C/CPFF | JHU APL : Baltimore, MD | 0.200 | 0.200 | May 2017 | 0.200 | May 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Demonstration & Evaluation | WR | NUWC Keyport : Keyport, WA | 0.050 | 0.050 | Mar 2017 | 0.050 | Mar 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Demonstration & Evaluation | WR | NSWC CD : Carderock, MD | 0.250 | 0.250 | Dec 2016 | 0.250 | Dec 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Demonstration & Evaluation | WR | NSWC PD : Philadelphia, PA | 0.125 | 0.125 | Dec 2016 | 0.125 | Dec 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Cybersecurity Technologies | C/CPFF | JHU/APL : Baltimore, MD | 1.585 | 1.583 | May 2017 | 3.791 | May 2018 | 1.500 | May 2019 | - | | 1.500 | Continuing | Continuing | Continuing |
| Cybersecurity Technologies | C/CPFF | MITRE : McLean, VA | 0.304 | 0.304 | Oct 2016 | 0.500 | Oct 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Cybersecurity Technologies | MIPR | PNNL DOE : Richland, WA | 0.300 | 0.300 | Jul 2017 | 0.300 | Jul 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Engineerign Development | WR | NSWC CD : Carderock, MD | 0.000 | 0.000 | | 0.000 | | 1.330 | Oct 2018 | - | | 1.330 | 0.000 | 1.330 | - |
| Engineerign Development | WR | NUWC Keyport : Keyport, WA | 0.000 | 0.000 | | 0.000 | | 0.020 | Oct 2018 | - | | 0.020 | 0.000 | 0.020 | - |
| Engineering Development | WR | PHD NSWC : Port Hueneme, CA | 0.030 | 0.030 | May 2017 | 0.030 | May 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Engineerign Development | C/CPFF | Various Contractors : Various | 0.000 | 0.000 | | 0.000 | | 5.350 | Oct 2018 | - | | 5.350 | 0.000 | 5.350 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603563N / *Ship Concept Advanced Design* | Project (Number/Name)<br>3161 / *NAVSEA Tech Authority* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cybersecurity Technologies | WR | NUWC Keyport : Keyport, WA | 0.000 | 0.000 | | 0.000 | | 0.350 | Dec 2018 | - | | 0.350 | 0.000 | 0.350 | - |
| Cybersecurity Technologies | WR | NUWC Newport : Newport, RI | 0.000 | 0.000 | | 0.000 | | 0.600 | Dec 2018 | - | | 0.600 | 0.000 | 0.600 | - |
| Cybersecurity Technologies | WR | NSWC Crane : Crane, IN | 0.000 | 0.000 | | 0.000 | | 0.350 | Dec 2018 | - | | 0.350 | 0.000 | 0.350 | - |
| Cybersecurity Technologies | WR | NSWC DD : Dahlgren, VA | 0.000 | 0.000 | | 0.000 | | 7.600 | Dec 2018 | - | | 7.600 | 0.000 | 7.600 | - |
| Cybersecurity Technologies | WR | NSWC PD : Philadelphia, PA | 0.000 | 0.000 | | 0.000 | | 2.100 | Dec 2018 | - | | 2.100 | 0.000 | 2.100 | - |
| | | **Subtotal** | 179.658 | 7.422 | | 11.529 | | 22.528 | | - | | 22.528 | Continuing | Continuing | N/A |

**Remarks**

Product development cost growth identified for Engineering Development in FY19 is required to support CPSD efforts. Additive Manufacturing and traditional materials technology are high growth areas in FY19 that will provide increased Fleet readiness and improve warfighting capacity by enabling production at or near the point of need. ***Cybersecurity Technologies cost growth funds added for comprehensive set of cyber warfighting capabilities to meet existing Fleet cybersecurity gaps, added distributed cyber test capability, cyber test and assessment capability and cybersecurity T&E policy, directives and requirements. Funding moved from engineering development and systems engineering categories to better define cyber-specific funding allocations.

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Systems Engineering | WR | NUWC Newport : Newport, RI | 0.100 | 0.100 | Dec 2016 | 0.100 | Dec 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Systems Engineering | WR | NSWC DD : Dahlgren, VA | 0.100 | 0.100 | Mar 2017 | 0.100 | Mar 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Systems Engineering | WR | NSWC CD : Carderock, MD | 0.250 | 0.250 | Dec 2016 | 0.250 | Dec 2017 | 0.500 | Dec 2018 | - | | 0.500 | Continuing | Continuing | Continuing |
| Systems Engineering | WR | NSWC PD : Philadelphia, PA | 0.125 | 0.125 | Oct 2016 | 0.175 | Oct 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Systems Engineering | C/CPFF | G2OPS : Virginia Beach, VA | 0.250 | 0.250 | Mar 2017 | 0.250 | Mar 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>3161 / *NAVSEA Tech Authority* |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Systems Engineering | C/CPFF | JHU/APL : Baltimore, MD | 0.100 | 0.100 | May 2017 | 0.100 | May 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Cybersecurity Technologies | WR | NSWC CD : Carderock, MD | 0.000 | 0.000 | | 0.000 | | 1.489 | Dec 2018 | - | | 1.489 | 0.000 | 1.489 | - |
| Cybersecurity Technologies | MIPR | SPAWAR : Various | 0.000 | 0.000 | | 0.000 | | 0.250 | Dec 2018 | - | | 0.250 | 0.000 | 0.250 | - |
| Cybersecurity Technologies | C/CPFF | Various Contractors : Various | 0.000 | 0.000 | | 0.000 | | 1.500 | Jan 2019 | - | | 1.500 | 0.000 | 1.500 | - |
| | | **Subtotal** | 0.925 | 0.925 | | 0.975 | | 3.739 | | - | | 3.739 | Continuing | Continuing | N/A |

**Remarks**

Cybersecurity Technologies cost growth funds added for comprehensive set of cyber warfighting capabilities to meet existing Fleet cybersecurity gaps, added distributed cyber test capability, cyber test and assessment capability and cybersecurity T&E policy, directives and requirements. Funding moved from engineering development and systems engineering categories to better define cyber-specific funding allocations.Funding moved from engineering development and systems engineering categories to better define cyber-specific funding allocations.

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Test Planning & Execution | WR | NSWC DD : Dahlgren, VA | 0.020 | 0.020 | Dec 2016 | 0.020 | Dec 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Cybersecurity Technologies | WR | NSWC CD : Carderock, MD | 0.450 | 0.250 | Dec 2016 | 0.250 | Dec 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Cybersecurity Technologies | C/CPFF | JHU/APL : Baltimore, MD | 0.100 | 0.450 | May 2017 | 0.100 | May 2018 | 0.500 | May 2019 | - | | 0.500 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.570 | 0.720 | | 0.370 | | 0.500 | | - | | 0.500 | Continuing | Continuing | N/A |

**Remarks**

Cost growth at JHU/APL for T&E is due the acceleration of a distributed Cyber test capability.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>3161 / *NAVSEA Tech Authority* |

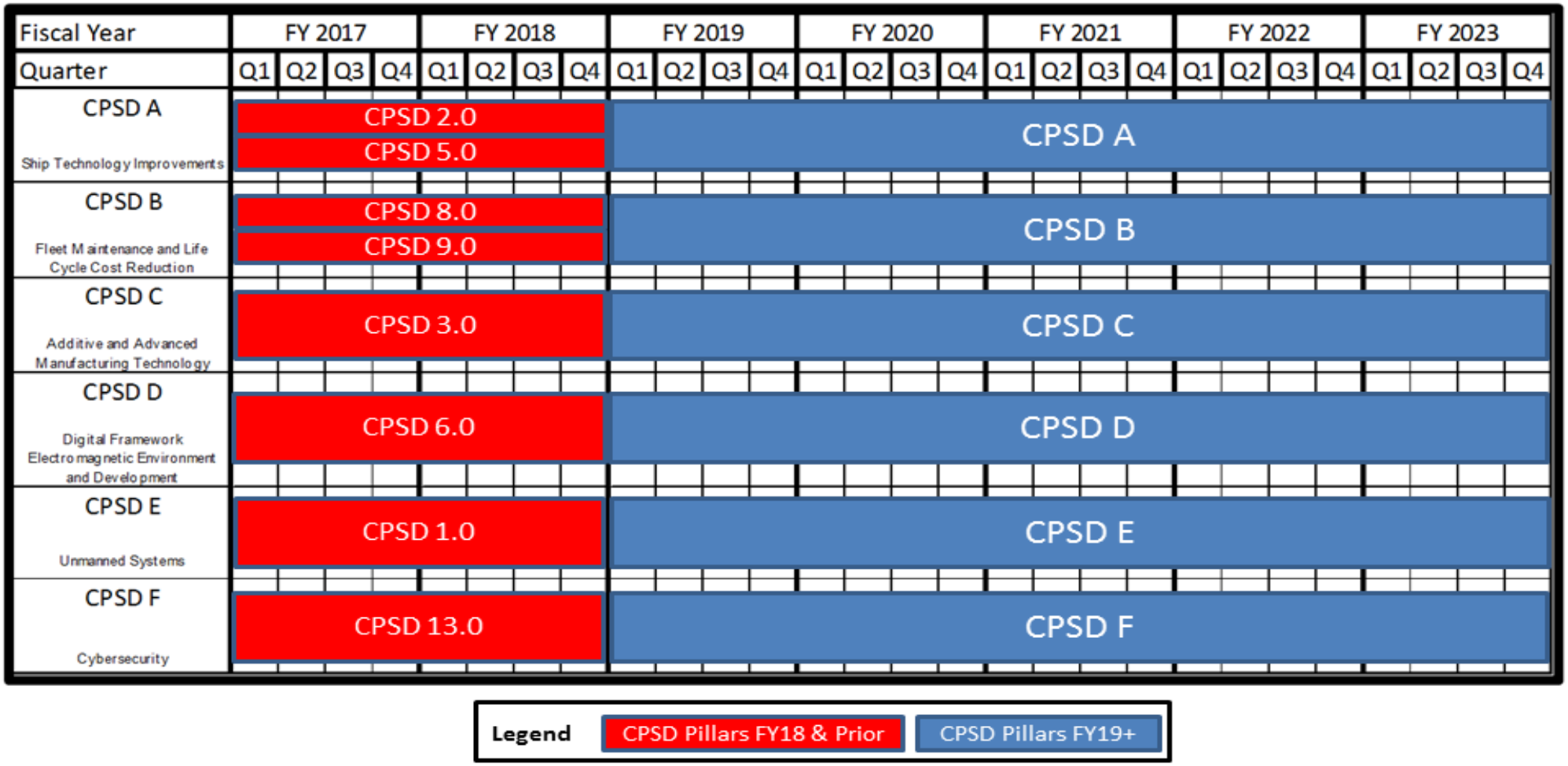
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PM/Travel | Allot | NAVSEA HQ : Washington, DC | 0.700 | 0.049 | Dec 2016 | 0.050 | Dec 2017 | 0.050 | Dec 2018 | - | | 0.050 | Continuing | Continuing | Continuing |
| DAWDF | Various | Not Specified : Not Specified | 0.145 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Program Mgmt Spt | WR | NUWC Newport : Newport, RI | 0.032 | 0.032 | Dec 2016 | 0.032 | Dec 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Program Mgmt Spt | WR | NSWC DD : Dahlgren, VA | 0.100 | 0.100 | Dec 2016 | 0.100 | Dec 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Program Mgmt Spt | WR | NSWC CD : Carderock, MD | 0.250 | 0.250 | Nov 2016 | 0.250 | Nov 2017 | 0.250 | Nov 2018 | - | | 0.250 | Continuing | Continuing | Continuing |
| Program Mgmt Spt | C/CPFF | CSC : Washington, D.C. | 0.105 | 0.105 | Jul 2017 | 0.105 | Jul 2018 | 0.250 | Nov 2018 | - | | 0.250 | Continuing | Continuing | Continuing |
| Program Mgmt Spt | C/FFP | ARDEC : Picatinny Arsenal, NJ | 0.100 | 0.100 | Jun 2017 | 0.100 | Jun 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Program Mgmt Spt | MIPR | PNNL DOE : Richland, WA | 0.071 | 0.071 | Jul 2017 | 0.071 | Jul 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Cybersecurity Technologies | C/CPFF | CSC : Washington, D.C. | 0.000 | 0.000 | | 0.000 | | 0.250 | Dec 2018 | - | | 0.250 | 0.000 | 0.250 | - |
| Cybersecurity Technologies | C/CPFF | Alion : Washington, D.C. | 0.000 | 0.000 | | 0.000 | | 0.250 | Dec 2018 | - | | 0.250 | 0.000 | 0.250 | - |
| | | **Subtotal** | 1.503 | 0.707 | | 0.708 | | 1.050 | | - | | 1.050 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 182.656 | 9.774 | | 13.582 | | 27.817 | | - | | 27.817 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>3161 / *NAVSEA Tech Authority* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>3161 / *NAVSEA Tech Authority* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3161*** | | | | |
| Platform Concept Advanced Development | 1 | 2017 | 4 | 2018 |
| Ship Systems Engineering/Modular Ship Systems Development (PNA) | 1 | 2017 | 4 | 2018 |
| Alternative HM&E Systems Engineering | 1 | 2017 | 4 | 2018 |
| Mission Capability Affordability and Sustainment | 1 | 2017 | 4 | 2018 |
| Cybersecurity Technologies | 1 | 2017 | 4 | 2018 |
| Future Surface Combatant Study | 1 | 2017 | 4 | 2018 |
| High Speed Ships and Craft Engineering (HFP) | 1 | 2017 | 4 | 2018 |
| Embedded Interoperability Engineering | 1 | 2017 | 4 | 2018 |
| Platform Design and Certification Tools/Engineering and Tech Data Exchange Development | 1 | 2017 | 4 | 2018 |
| Future Surface Combatant Studies | 1 | 2017 | 4 | 2017 |
| CPSD A - Ship Technology Improvements | 1 | 2019 | 4 | 2023 |
| CPSD B - Fleet Maintenance and Life Cycle Cost Reduction | 1 | 2019 | 4 | 2023 |
| CPSD C - Additive and Advanced Manufacturing Technology | 1 | 2019 | 4 | 2023 |
| CPSD D - Digital Framework/Electromagnetic Environment and Development | 1 | 2019 | 4 | 2023 |
| CPSD E - Unmanned Systems | 1 | 2019 | 4 | 2023 |
| CPSD F - Cybersecurity | 1 | 2019 | 1 | 2023 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603563N / *Ship Concept Advanced Design* | Project (Number/Name)<br>3376 / *Strategic Sealift* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3376: *Strategic Sealift* | 5.593 | 4.153 | 0.000 | 6.335 | - | 6.335 | 6.004 | 6.127 | 6.250 | 6.377 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Project 3376 - Strategic Sealift Research and Development - Develops new concepts and technologies which can be applied to or will enable future strategic sealift, and Seabasing systems. The technologies include ship configuration concepts, equipment to increase cargo handling and cargo loading/unloading rates (including commercial and merchant ship systems), improved man/machine interfaces, improved structural configurations and materials, and Logistics-Over-the-Shore (LOTS) equipment and system improvements.

Note: FY2018, FY2016 and prior year efforts were financed under the National Sealift Defense Fund (NDSF) BA 04, Project 3116 (Strategic Sealift Research and Development. FY2017 and FY2019-FY2023 efforts are financed under this program element.

FY 18 NDSF BA 04 Project 3116 amount: $6.425 million

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Shipboard Crane Systems/Shipboard Cargo Systems | 1.311 | 0.000 | 3.800 | 0.000 | 3.800 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY2018 efforts are being funded under the National Defense Sealift Fund (NDSF) BA 04, Project 3116 (Strategic Sealift Research and Development). FY18 = $2.925M | | | | | |
| ***FY 2019 Base Plans:***<br>Continue investigation and demonstration of shipboard crane/cargo system improvements including weapons handling and transfer capabilities. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>National Defense Sealift Fund (NDSF) disestablished transferring funds into RDTEN. Minor increase (+$875K) from FY18 ($2.925M). The increase in the Shipboard Crane category is due to efforts related to Vertical Launch System rearming and MPS fleet crane enhancement. The plan during FY19 is to implement and conduct | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>3376 / *Strategic Sealift* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| shipboard demonstrations of systems, technologies, and procedures developed during FY18 for VLS rearming and to conduct a shipboard installation and underway test of upgraded crane controls on USNS Pililaau. | | | | | |
| ***Title:*** Sealift Concept Development<br>***Articles:***<br>***FY 2018 Plans:***<br>FY2018 efforts are being funded under the National Defense Sealift Fund (NDSF) BA 04, Project 3116 (Strategic Sealift Research and Development). FY18 = $1.900M<br>***FY 2019 Base Plans:***<br>Continue providing Sealift Research and Technology development and program guidance. Conduct Sealift ship concept development and analysis.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>National Defense Sealift Fund (NDSF) disestablished transferring funds into RDTEN. Minor decrease from FY2018 (-$1.150M). | 1.842<br>- | 0.000<br>- | 0.750<br>- | 0.000<br>- | 0.750<br>- |
| ***Title:*** Lighter/HSV Seabase to Shore Cargo Transfer<br>***Articles:***<br>***FY 2018 Plans:***<br>FY2018 efforts are being funded under the National Defense Sealift Fund (NDSF) BA 04, Project 3116 (Strategic Sealift Research and Development). FY18 = $1.600M<br>***FY 2019 Base Plans:***<br>Continue development and demonstration of at-sea vehicle transfer capability.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>National Defense Sealift Fund (NDSF) disestablished transferring funds into RDTEN. Minor decrease from FY2018 (-$1.215M). | 1.000<br>- | 0.000<br>- | 0.385<br>- | 0.000<br>- | 0.385<br>- |
| ***Title:*** Advanced Tools | 0.000 | 0.000 | 1.400 | 0.000 | 1.400 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>3376 / *Strategic Sealift* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY2018 efforts are being funded under the National Defense Sealift Fund (NDSF) BA 04, Project 3116 (Strategic Sealift Research and Development). No funding for this subproject effort in PB18 budget.<br>***FY 2019 Base Plans:***<br>Continue investigation and demonstration of individual and multiship motion measurement and prediction.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>National Defense Sealift Fund (NDSF) disestablished transferring funds into RDTEN.<br><br>The increase (+$1.400M) of the Advanced Tools effort reflects a planned increase in prototype development and shipboard installation efforts for individual and multiship motion measurement and prediction technology. The result of this increased effort is to allow the technology to be evaluated and matured based on performance in an operational environment on a variety of vessel types. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 4.153 | 0.000 | 6.335 | 0.000 | 6.335 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • NDSF/0900 (3116): *Strategic Sealift Research and Development* | 0.000 | 6.425 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 65.256 |

**Remarks**

**D. Acquisition Strategy**

Not applicable for SEALIFT R&D efforts.

**E. Performance Metrics**

Annual Program Review.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>3376 / *Strategic Sealift* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Shipboard Crane Systems/ Shipboard Cargo Systems | WR | Various Contractors : Various | 1.250 | 1.311 | Jan 2017 | 0.000 | | 3.800 | Jan 2019 | - | | 3.800 | Continuing | Continuing | Continuing |
| Sealift Concept Development | WR | Various Contractors : Various | 1.283 | 1.842 | Jan 2017 | 0.000 | | 0.750 | Jan 2019 | - | | 0.750 | Continuing | Continuing | Continuing |
| Lighter/HSV Seabase to Shore Cargo Transfer | WR | Various Contractors : Various | 3.060 | 1.000 | Jan 2017 | 0.000 | | 0.385 | Jan 2019 | - | | 0.385 | Continuing | Continuing | Continuing |
| Advance Tools | WR | Various : Various | 0.000 | 0.000 | | 0.000 | | 1.400 | Jan 2019 | - | | 1.400 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 5.593 | 4.153 | | 0.000 | | 6.335 | | - | | 6.335 | Continuing | Continuing | N/A |

**Remarks**

1. FY2018, FY2016 and prior years (FY14 and earlier) were funded under NDSF BA 04 Project 3116 Strategic Sealift Research and Development.
2. Award dates reflect initial date of incremental funding execution.

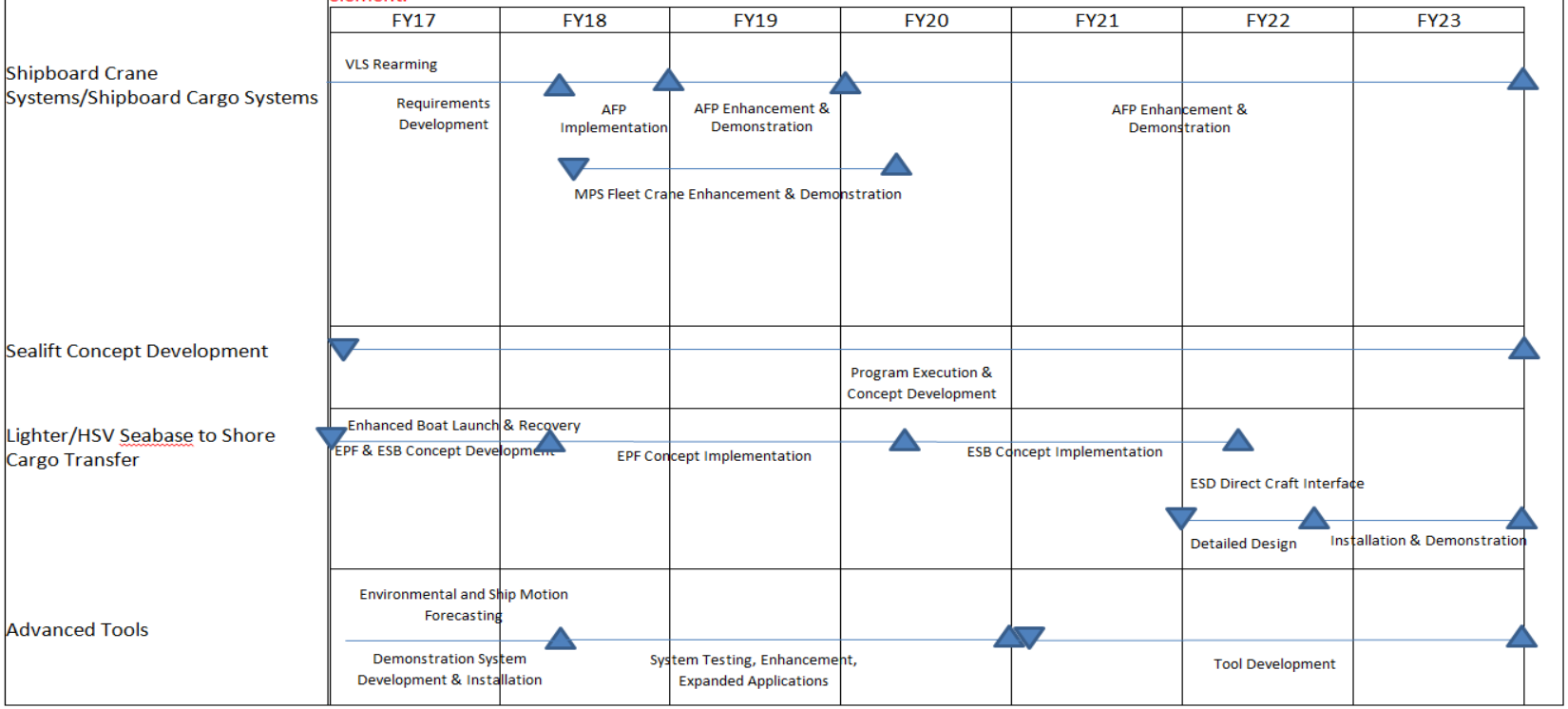
| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 5.593 | 4.153 | | 0.000 | | 6.335 | | - | | 6.335 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>3376 / *Strategic Sealift* |

| Exhibit R-4, RDT&E Schedule Profile: PB 19 Navy | | Date: January 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>4557/ 04 | **R-1 Program Element (Number/Name)**<br>PE 0603563N, Ship Concept Advanced Design | **Project (Number/Name)**<br>Project 3376 Strategic Sealift |

Note: FY2018, FY2016 and prior year (FY14 and earlier) efforts were financed under the National Sealift Defense Fund (NDSF) BA 04, Project 3116 (Strategic Sealift Research and Development. FY 2017, FY2019 and out-year funds are financed under this program element.



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>3376 / *Strategic Sealift* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3376*** | | | | |
| Shipboard Crane Systems/Shipboard Cargo Systems | 1 | 2017 | 4 | 2023 |
| Sealift Concept Development | 1 | 2017 | 4 | 2023 |
| Lighter/HSV Seabase to Shore Cargo Transfer | 1 | 2017 | 4 | 2023 |
| Advanced Tools | 1 | 2017 | 4 | 2023 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603563N / *Ship Concept Advanced Design* | Project (Number/Name)<br>4037 / *Common Hull Auxiliary Multi-Mission Platform (CHAMP)* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4037: *Common Hull Auxiliary Multi-Mission Platform (CHAMP)* | 0.000 | 0.000 | 0.000 | 18.000 | - | 18.000 | 8.000 | 8.000 | 0.000 | 0.000 | 0.000 | 34.000 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Note: This program is a new start in FY19.

The Common Hull Auxiliary Multi-mission Platform (CHAMP) concept leverages a new approach to requirements generation and shipbuilding to replace aging mission specific designs with a common hull to reduce life cycle costs, leverage tailored payloads, and stabilize the industrial base. Identified CHAMP missions include: Sealift, Aviation Intermediate Maintenance support, Medical Services, Command & Control, and Submarine Tending. FY 2019 funding supports Industry Studies to inform requirements definition, provide early industry engagement and follow-on assessment across CHAMP mission functionality.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** CHAMP Design and Total Ship Integration | 0.000 | 0.000 | 18.000 | 0.000 | 18.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>N/A | | | | | |
| ***FY 2019 Base Plans:***<br>CHAMP Design and Total Ship Integration - Issue Industry Studies RFP, conduct source selection and award Industry Studies contracts. Industry Studies will include trade studies and analysis on main machinery, reconfigurable system arrangements, and ship and reconfigurable system interfaces. Develop and initiate initial acquisition planning documents. Coordinate with NAVSEA, MSC, PEO Ships, CNO, ASN RD&A, OSD and Fleet. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>New program to support integrated concept ship design, requirements definition for the CHAMP program. Funds added to start early industry studies for a replacement to several ship classes. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 0.000 | 18.000 | 0.000 | 18.000 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>4037 / *Common Hull Auxiliary Multi-Mission Platform (CHAMP)* |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Develop and issue Industry Studies RFP for award of multiple contracts in FY19 to participate in trade studies and analysis on main machinery, reconfigurable system arrangements, and ship and reconfigurable system interfaces. Based on the results of the tradeoffs, develop integrated design and inform Government requirements definition for future ship acquisition.

**E. Performance Metrics**

None.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>4037 / *Common Hull Auxiliary Multi-Mission Platform (CHAMP)* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Design Trade-off Tool & Design Studies | WR | NSWC : MD | 0.000 | 0.000 | | 0.000 | | 1.000 | Nov 2018 | - | | 1.000 | 1.000 | 2.000 | - |
| Industry Studies | C/FFP | Various : Various | 0.000 | 0.000 | | 0.000 | | 13.000 | Jul 2019 | - | | 13.000 | 3.000 | 16.000 | - |
| Engineering Support | Various | Various : Various | 0.000 | 0.000 | | 0.000 | | 3.000 | Nov 2018 | - | | 3.000 | 3.500 | 6.500 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 17.000 | | - | | 17.000 | 7.500 | 24.500 | N/A |

**Remarks**

Funds new program to start early industry studies for a replacement to several ship classes for CHAMP Design and Total Ship Integration efforts.

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RFP & Program Documentation Development | Various | Various : Various | 0.000 | 0.000 | | 0.000 | | 1.000 | Nov 2018 | - | | 1.000 | 0.500 | 1.500 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 1.000 | | - | | 1.000 | 0.500 | 1.500 | N/A |

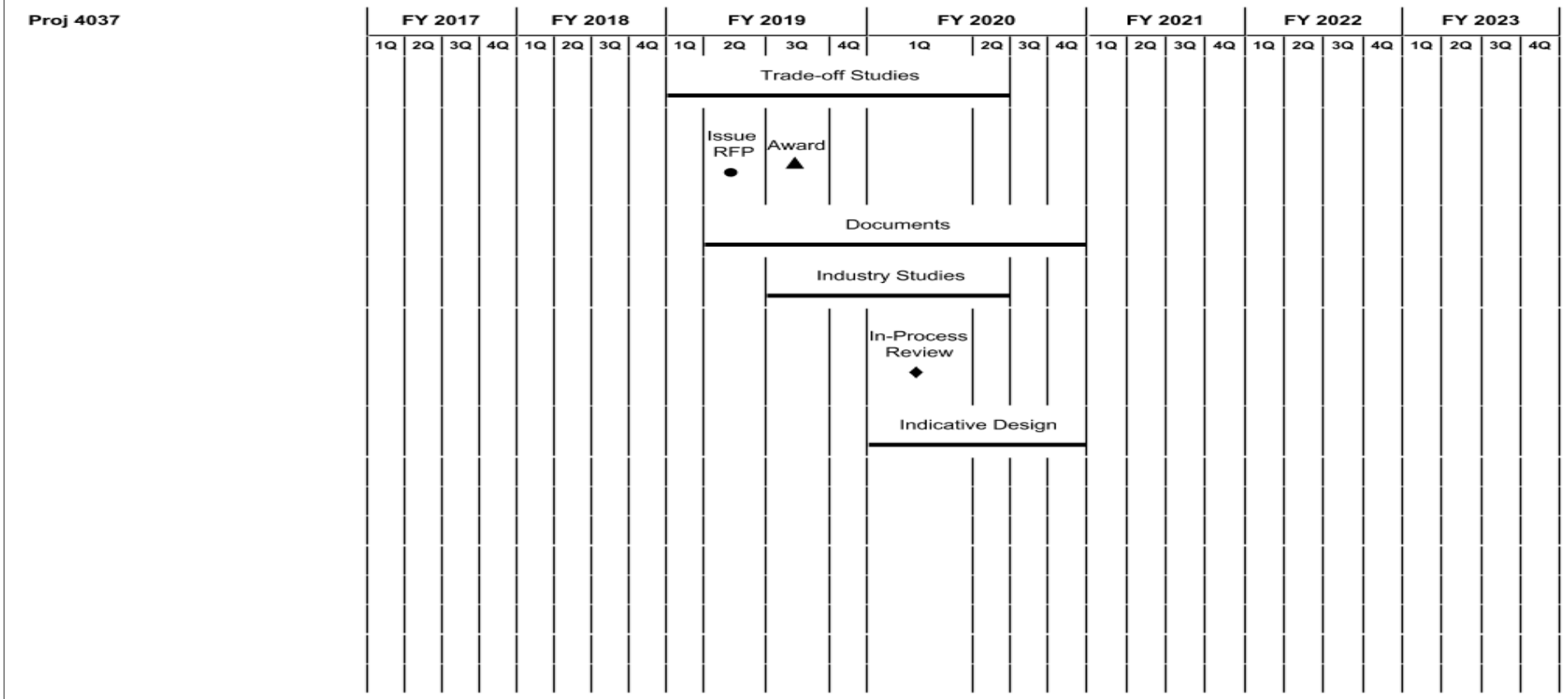
**Remarks**

Funds new program to start early industry studies for a replacement to several ship classes for CHAMP Design and Total Ship Integration efforts.

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 0.000 | | 18.000 | | - | | 18.000 | 8.000 | 26.000 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>4037 / *Common Hull Auxiliary Multi-Mission Platform (CHAMP)* |




*2019PB - 0603563N - 4037*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603563N / *Ship Concept Advanced Design* | **Project (Number/Name)**<br>4037 / *Common Hull Auxiliary Multi-Mission Platform (CHAMP)* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 4037*** | | | | |
| Design Trade-off Tool & Design Studies | 1 | 2019 | 2 | 2020 |
| Issue Industry Studies Request for Proposal | 2 | 2019 | 2 | 2019 |
| Industry Studies Award | 3 | 2019 | 3 | 2019 |
| Program Documentaion Development | 2 | 2019 | 4 | 2020 |
| Industry Studies | 3 | 2019 | 2 | 2020 |
| In-Process Review | 1 | 2020 | 1 | 2020 |
| Indicative Design Development | 1 | 2020 | 4 | 2020 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603564N *I Ship Prel Design & Feasibility Studies* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 3.646 | 13.451 | 12.012 | 13.348 | - | 13.348 | 22.534 | 9.320 | 9.494 | 9.687 | Continuing | Continuing |
| 3261: *TAGOS Design & Total Ship Integration* | 0.000 | 0.000 | 12.012 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 12.012 |
| 3377: *T-ATS Ship Concept Development* | 3.646 | 0.941 | 0.000 | 0.393 | - | 0.393 | 0.393 | 0.000 | 0.000 | 0.000 | 0.000 | 5.373 |
| 3389: *OPLOG IPT Development* | 0.000 | 12.510 | 0.000 | 12.955 | - | 12.955 | 22.141 | 9.320 | 9.494 | 9.687 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

The FY 2019 funding request was reduced by $.139 million to reflect the Department of Navy's effort to support the Office of Management and Budget directed reforms for Efficiency and Effectiveness that include a lean, accountable, more efficient government.

3261 - T-AGOS Design & Total Ship Integration - Ocean surveillance ships gather underwater acoustical data to support the mission of the Integrated Undersea Surveillance System by providing a ship platform capable of theater anti-submarine acoustic passive and active surveillance. Auxiliary General Ocean Surveillance Ships (T-AGOS) are operated by Military Sealift Command to support the anti-submarine warfare mission of the commanders of the Atlantic and Pacific Fleets. The two current classes of surveillance ships use surveillance towed-array sensor system (SURTASS) equipment to gather undersea acoustic data. The ships also carry electronic equipment to process and transmit that data via satellite to shore stations for evaluation. Funding will support recapitalization of the four SWATH (T-19 Class) and one SWATH (T-23 Class) Auxiliary General Ocean Surveillance ships (T-AGOS). Funding for FY19 to FY23 was transferred to PE 0204313N (Ship-Towed Array Surveillance Systems.

3377 - The Navy requires ocean-going towing, salvage, and rescue capabilities to support Fleet operations. The Navy's current capabilities are provided by four T-ATF 166 class Fleet Tugs and four T-ARS 50 class Salvage ships which reach the end of their expected service lives starting in 2020 and 2025, respectively.

The T-ATF Fleet Tugs perform towing at sea, salvage, and diving operations; act as a support ship for portable deep-diving equipment and submarine rescue operations; provide fire-fighting assistance; and perform oil spill pollution abatement. The T-ARS Salvage Ships perform combat salvage, lifting, emergency repair, and rescue towing of combatant or support ships damaged, stranded, scuttled, distressed, or abandoned at sea to repair yards or safe havens. The T-ATS program will recapitalize the current Fleet Tugs and Salvage Ships with a common hull Towing, Salvage and Rescue Ship (T-ATS) that is capable of performing the missions of the retiring T-ATF and T-ARS classes.

3389 - Naval Operational Logistics (OPLOG) Integration IPT Development - Develops enabling technologies for future and in-service afloat operational logistics and integrated supply force and combatant logistics requirements; and conducts cooperative initiatives with acquisition programs, program sponsors, engineering managers, the Navy science and technology community and Fleet customers. OPLOG develops integrated, cross-platform (i.e. applicable to more than one ship class/type)

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603564N *I Ship Prel Design & Feasibility Studies* |

operational logistics and energy conservation technologies and capabilities as well as draft acquisition and operations policy ensuring future Naval systems leverage emerging logistic capabilities and technologies to provide operationally effective and energy efficient logistics delivery.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 15.805 | 12.012 | 18.990 | - | 18.990 |
| Current President's Budget | 13.451 | 12.012 | 13.348 | - | 13.348 |
| Total Adjustments | -2.354 | 0.000 | -5.642 | - | -5.642 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -0.354 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | -5.611 | - | -5.611 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -0.031 | - | -0.031 |
| • Congressional Directed Reductions Adjustments | -2.000 | - | - | - | - |

**Change Summary Explanation**

FY 19 changes include:

1. FY19 reduction in T-AGOS (Project 3261) due to transfer to new PE 0204313N (Ship-Towed Array Surveillance Systems)

2. Increase in OPLOGINT (Project 3389) due to transfer from NDSF and adding funding for the development of a Robust Expeditionary Fuel System.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603564N / *Ship Prel Design & Feasibility Studies* | Project (Number/Name)<br>3261 / *TAGOS Design & Total Ship Integration* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3261: *TAGOS Design & Total Ship Integration* | 0.000 | 0.000 | 12.012 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 12.012 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

Funding for FY19 to FY23 was transferred to PE 0204313N.

**A. Mission Description and Budget Item Justification**

T-AGOS Design & Total Ship Integration - Ocean surveillance ships gather underwater acoustical data to support the mission of the Integrated Undersea Surveillance System by providing a ship platform capable of theater anti-submarine acoustic passive and active surveillance. Auxiliary General Ocean Surveillance Ships (T-AGOS) are operated by Military Sealift Command to support the anti-submarine warfare mission of the commanders of the Atlantic and Pacific Fleets. The two current classes of surveillance ships use surveillance towed-array sensor system (SURTASS) equipment to gather undersea acoustic data. The ships also carry electronic equipment to process and transmit that data via satellite to shore stations for evaluation. Funding will support recapitalization of the four SWATH (T-19 Class) and one SWATH (T-23 Class) Auxiliary General Ocean Surveillance ships (T-AGOS).

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** T-AGOS Design & Total Ship Integration | 0.000 | 12.012 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |

***FY 2018 Plans:***

Prepare and initiate staffing and approval for initial acquisition planning documents. Conduct Gate 2 to initiate development of the Capability Development Document (CDD). Conduct trade studies to support the development of a Pre-preliminary Design. Develop SURTASS interface documentation. Develop Request for Proposal (RFP) for Industry Studies to support the Navy led Preliminary Design. Prepare Milestone A Documentation. Coordinate acquisition efforts with NAVSEA, MSC, PEO SHIPS, CNO, ASN RD&A, OSD, and Fleet.

***FY 2019 Base Plans:***

Funding for FY19 to FY23 was transferred to PE 0204313N.

***FY 2019 OCO Plans:***

N/A

***FY 2018 to FY 2019 Increase/Decrease Statement:***

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603564N / *Ship Prel Design & Feasibility Studies* | **Project (Number/Name)**<br>3261 / *TAGOS Design & Total Ship Integration* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| P/U 3261's Funding for FY19 to FY23 was transferred to PE 0204313N. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 12.012 | 0.000 | 0.000 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • SCN/5030: *T-AGOS Surtass Ships* | 0.000 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 343.244 | 369.000 | 901.000 | 1,613.244 |

**Remarks**

**D. Acquisition Strategy**

Develop CDD, conduct trade studies and Pre-Preliminary Design in FY18. Issue RFP for Industry Studies for award of multiple contracts in FY19 to participate in Navy-led Preliminary/Contract Design (PD/CD) efforts. Complete Navy-led PD/CD efforts in FY21in order to issue Detail Design and Construction (DD&C) RFP and award to a single shipbuilder in FY22 for DD&C of a Lead Ship with options for up to four follow-on ships.

**E. Performance Metrics**

None.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603564N / *Ship Prel Design & Feasibility Studies* | **Project (Number/Name)**<br>3261 / *TAGOS Design & Total Ship Integration* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Engineering Integration/ Design | Various | Various : Various | 0.000 | 0.000 | | 4.613 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 4.613 | - |
| Model Testing | Various | Various : Various | 0.000 | 0.000 | | 1.162 | Jun 2018 | 0.000 | | - | | 0.000 | 0.000 | 1.162 | - |
| SURTASS Integration | Various | various : various | 0.000 | 0.000 | | 2.000 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 2.000 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 7.775 | | 0.000 | | - | | 0.000 | 0.000 | 7.775 | N/A |

**Remarks**

Funding for FY19 to FY23 was transferred to PE 0204313N.

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MS documentation prep & RFP Development | Various | Various : Various | 0.000 | 0.000 | | 1.300 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 1.300 | - |
| Specification & TDP Development | Various | Various : Various | 0.000 | 0.000 | | 1.537 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 1.537 | - |
| Systems Integration (C4I/ Safety/Risk) | Various | Various : Various | 0.000 | 0.000 | | 1.000 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 1.000 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 3.837 | | 0.000 | | - | | 0.000 | 0.000 | 3.837 | N/A |

**Remarks**

Funding for FY19 to FY23 was transferred to PE 0204313N.

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Test and Evaluation Planning | Various | Various : Various | 0.000 | 0.000 | | 0.400 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.400 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.400 | | 0.000 | | - | | 0.000 | 0.000 | 0.400 | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603564N / *Ship Prel Design & Feasibility Studies* | Project (Number/Name)<br>3261 / *TAGOS Design & Total Ship Integration* | |

**Test and Evaluation ($ in Millions)**

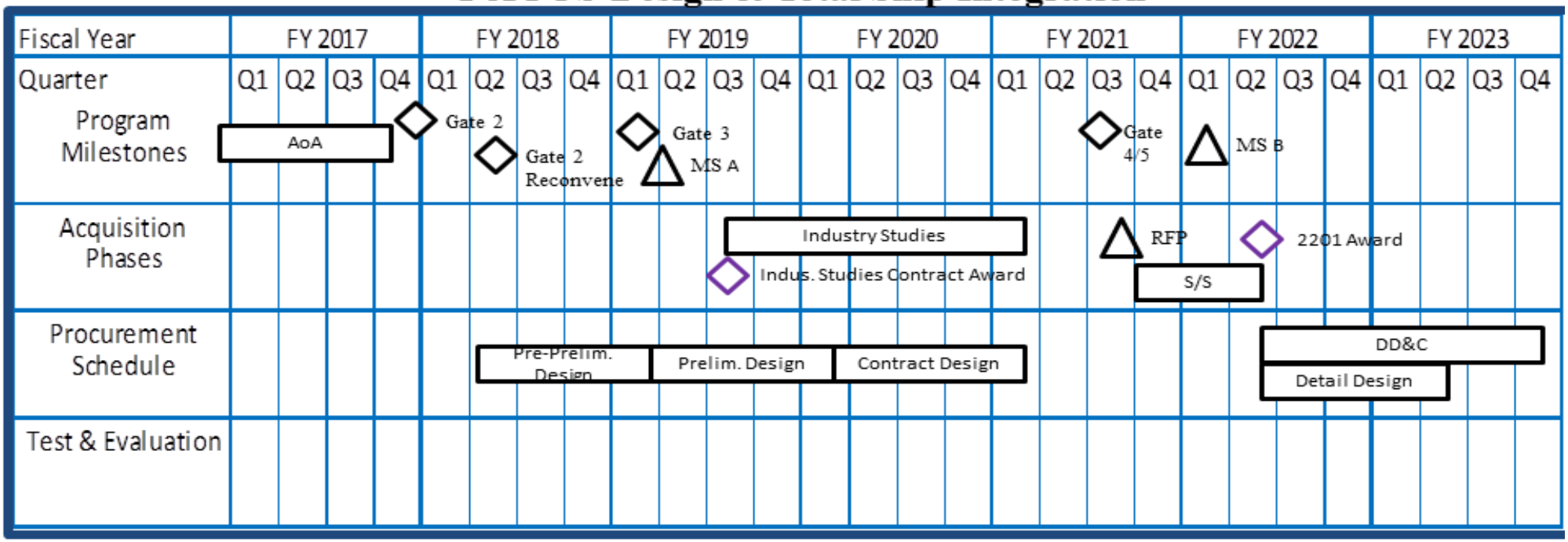
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Remarks** | | | | | | | | | | | | | | | |
| Funding for FY19 to FY23 was transferred to PE 0204313N. | | | | | | | | | | | | | | | |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 12.012 | | 0.000 | | - | | 0.000 | 0.000 | 12.012 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603564N / *Ship Prel Design & Feasibility Studies* | **Project (Number/Name)**<br>3261 / *TAGOS Design & Total Ship Integration* |

## T-AGOS Design & Total Ship Integration



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603564N / *Ship Prel Design & Feasibility Studies* | **Project (Number/Name)**<br>3261 / *TAGOS Design & Total Ship Integration* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3261*** | | | | |
| Gate 3 | 1 | 2019 | 1 | 2019 |
| Milestone B | 1 | 2022 | 1 | 2022 |
| DD&C Award | 2 | 2022 | 2 | 2022 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603564N / *Ship Prel Design & Feasibility Studies* | Project (Number/Name)<br>3377 / *T-ATS Ship Concept Development* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3377: *T-ATS Ship Concept Development* | 3.646 | 0.941 | 0.000 | 0.393 | - | 0.393 | 0.393 | 0.000 | 0.000 | 0.000 | 0.000 | 5.373 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

T-ATS Design - Recapitalizes the existing T-ATF 166 Fleet Tug and T-ARS 50 Salvage Ship Classes with a common hull Towing, Salvage and Rescue Ship (T-ATS) to support Fleet operations. The T-ATF Fleet Tugs perform towing at sea, salvage, and diving operations; act as a support ship for portable deep-diving equipment and submarine rescue operations; provide fire-fighting assistance; and perform oil spill pollution abatement. The T-ARS Salvage Ships perform combat salvage, lifting, emergency repair, and rescue towing of combatant or support ships damaged, stranded, scuttled, distressed, or abandoned at sea to repair yards or safe havens. Funding supports Ship Concept Development and Test & Evaluation (T&E) for future tug, salvage, and rescue mission capabilities.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Ship Concept Development | 0.941 | 0.000 | 0.393 | 0.000 | 0.393 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Ship Concept Development and Test & Evaluation (T&E) for future tug, salvage, and rescue mission capabilities.<br><br>***FY 2018 Plans:***<br>N/A<br><br>***FY 2019 Base Plans:***<br>Support the execution of Test and Evaluation Phase Developmental Test (DT) schedule per the Test and Evaluation Master Plan (TEMP). Coordinate efforts with NAVSEA, Military Sealift Command (MSC), PEO Ships, Operational Test and Evaluation Force (OPTEVFOR) , Joint Interoperability Test Command (JITC) and OSD Director of Operational Test & Evaluation (ODT&E).<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY19 increase in P/U 3377 is due to T&E, which typically starts 1-2 years after contract award. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.941 | 0.000 | 0.393 | 0.000 | 0.393 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603564N / *Ship Prel Design & Feasibility Studies* | **Project (Number/Name)**<br>3377 / *T-ATS Ship Concept Development* |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • SCN/5035: *Towing, Salvage and Rescue Ship (T-ATS)* | 0.000 | 76.204 | 80.517 | - | 80.517 | 153.248 | 74.376 | 75.053 | 76.597 | 22.884 | 633.879 |

**Remarks**

**D. Acquisition Strategy**

Contract will be awarded February 2018.

**E. Performance Metrics**

None.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603564N / *Ship Prel Design & Feasibility Studies* | Project (Number/Name)<br>3377 / *T-ATS Ship Concept Development* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Engineering Support | Various | NAVAIR/NSWC/ SPAWAR : MD, MD, SC | 0.200 | 0.569 | Aug 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.769 | - |
| Industry Design Studies | Various | Various : Various | 0.679 | 0.000 | Aug 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.679 | - |
| | | **Subtotal** | 0.879 | 0.569 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.448 | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Milestone Documention Support | C/FFP | CSRA : DC | 1.917 | 0.124 | Aug 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.041 | - |
| RFP and Specification Development | Various | Alion/CSRA/ SPAWAR : DC, DC, SC | 0.560 | 0.148 | Aug 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.708 | - |
| Test & Evaluation Planning | Various | OPTEVFOR, CSC, ALION : VA, DC | 0.290 | 0.100 | Aug 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.390 | - |
| | | **Subtotal** | 2.767 | 0.372 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.139 | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Integrated Test & Evaluation | C/FFP | COMOPTEVFOR : VA | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | - |
| Development Test & Evaluation | C/FFP | Various : Various | 0.000 | 0.000 | | 0.000 | | 0.393 | Mar 2019 | - | | 0.393 | 0.393 | 0.786 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 0.393 | | - | | 0.393 | 0.393 | 0.786 | N/A |

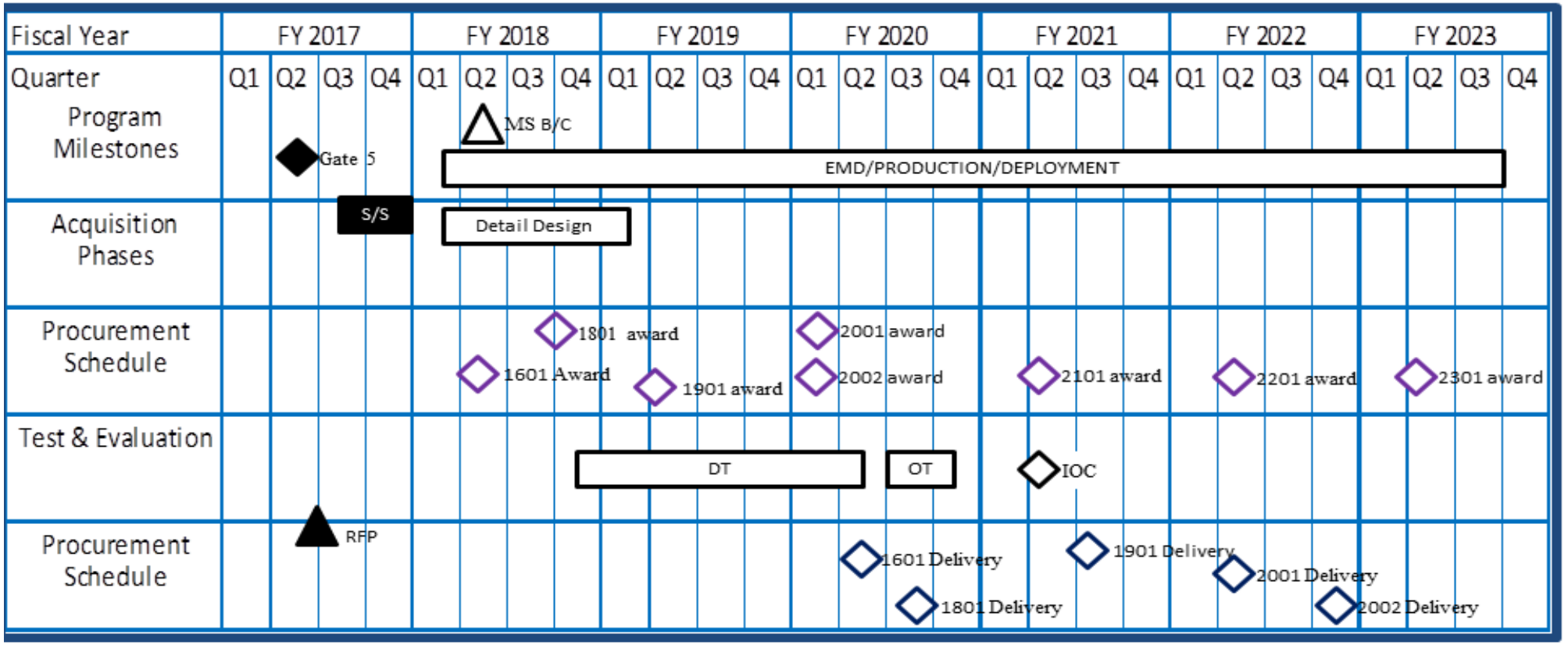
| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603564N / *Ship Prel Design & Feasibility Studies* | Project (Number/Name)<br>3377 / *T-ATS Ship Concept Development* | |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 3.646 | 0.941 | | 0.000 | | 0.393 | | - | | 0.393 | 0.393 | 5.373 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603564N / *Ship Prel Design & Feasibility Studies* | **Project (Number/Name)**<br>3377 / *T-ATS Ship Concept Development* |

## T-ATS Design & Total Ship Integration



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603564N / *Ship Prel Design & Feasibility Studies* | **Project (Number/Name)**<br>3377 / *T-ATS Ship Concept Development* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3377*** | | | | |
| MILESTONE B/C | 2 | 2018 | 2 | 2018 |
| DT/OT | 4 | 2018 | 4 | 2020 |
| IOC | 2 | 2021 | 2 | 2021 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603564N / *Ship Prel Design & Feasibility Studies* | Project (Number/Name)<br>3389 / *OPLOG IPT Development* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3389: *OPLOG IPT Development* | 0.000 | 12.510 | 0.000 | 12.955 | - | 12.955 | 22.141 | 9.320 | 9.494 | 9.687 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

FY2016 and prior year efforts were financed under PE 0408042N, National Defense Sealift Fund (NDSF) BA 04, Project 3117 Naval Operational Logistics (OPLOG) Integration. FY2017, FY2019 and out-years are financed under this program element. This project is not a new start.

**A. Mission Description and Budget Item Justification**

Project 3389 - Develops enabling technologies for future and in-service afloat operational logistics and integrated supply systems; defines integrated combat logistics force and combatant logistics requirements; and conducts cooperative initiatives with acquisition programs, program sponsors, engineering managers, the Navy science and technology community, and Fleet customers. OPLOG develops integrated, cross-platform (i.e. applicable to more than one ship class/type) operational logistics and energy conservation technologies and capabilities as well as draft acquisition and operations policy ensuring future Naval systems leverage emerging logistic capabilities and technologies to provide operationally effective and energy efficient logistics delivery.

Though the operational logistics family of systems touches all aspects of Naval presence and power projection, operational logistics capability and system interfaces typically have been left to individual acquisition programs to develop and resolve. Technology development is necessary to mitigate technological and operational risk before ship acquisition programs accept new technologies. This project provides a foundation for the transition and systems development of science & technology initiatives evolving from the Office of Naval Research (ONR) Power & Energy Future Naval Capabilities (FNC), Enterprise and Platform Enablers FNC, Seabasing FNC, and from other enabling Government, industry and academia concepts to the acquisition community. Thus, this project resources continued research and development of appropriate technologies with applicability to multiple acquisition programs and defines and matures performance and interface requirements for those technologies. This project continues to identify, develop, integrate, demonstrate, and transition logistics technologies to improve the cost effectiveness of Fleet at sea logistics delivery through outreach, coordination and collaboration with industry, academia, Fleet, and Enterprise representatives.

This project will continue to develop improved shipboard replenishment, transfer, and handling systems and components as well as asset visibility and standardized packaging technologies. This project includes development of approaches to reduce operation and maintenance costs of, and energy consumption by the logistics Fleet. This integrated suite of developed capabilities will enable multiple ship types to leverage common technologies common across DoD (Joint) and commercial transportation networks providing a more affordable, energy efficient, mission capable force. These capabilities and system-of-systems approach will be applied to concept development of future auxiliary force
architectures.

FY18 efforts were financed under NDSF,N BA04 Project

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603564N / *Ship Prel Design & Feasibility Studies* | **Project (Number/Name)**<br>3389 / *OPLOG IPT Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Advanced Systems | 1.943 | 0.000 | 5.800 | 0.000 | 5.800 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>N/A<br>***FY 2019 Base Plans:***<br>Research, development, and testing of advanced refueling systems and concepts to include performing relevant-testing of JOFF and REFS systems and complete detailed design in preparation for FY20 full-scale prototype fabrication and evaluation.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Increase result of program requirements moving from BA04 PE0408042N, National Defense Sealift Fund (NDSF) Project 3117 Naval Operational Logistics (OPLOG) Integration (FY16 and prior and FY18) to this budget for FY19 and follow. | | | | | |
| ***Title:*** Logistics Architectures | 0.050 | 0.000 | 0.050 | 0.000 | 0.050 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>N/A<br>***FY 2019 Base Plans:***<br>Conduct combat logistics force data collection and operational studies.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Increase result of program requirements moving from BA04 PE0408042N, National Defense Sealift Fund (NDSF) Project 3117 Naval Operational Logistics (OPLOG) Integration (FY16 and prior and FY18) to this budget for FY19 and follow. | | | | | |
| ***Title:*** Shipboard Energy Conservation (E-STREAM) | 5.000 | 0.000 | 1.119 | 0.000 | 1.119 |
| ***Articles:*** | - | - | - | - | - |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603564N / *Ship Prel Design & Feasibility Studies* | **Project (Number/Name)**<br>3389 / *OPLOG IPT Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***FY 2018 Plans:***<br>N/A<br>***FY 2019 Base Plans:***<br>Continue energy management approach improvements including efficient ESTREAM system and components. Data package development and prototype purchase, installations, and testing for energy initiatives including efficient shipboard replenishment at sea (RAS)Hybrid E-STREAM planned for FY 2019.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Increase result of program requirements moving from BA04 PE0408042N, National Defense Sealift Fund (NDSF) Project 3117 Naval Operational Logistics (OPLOG) Integration (FY16 and prior and FY18) to this budget for FY19 and follow. | | | | | |
| ***Title:*** Shipboard Energy Conservation (Other) | 5.517 | 0.000 | 5.986 | 0.000 | 5.986 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>N/A<br>***FY 2019 Base Plans:***<br>Continue energy management approach improvements including validation of energy savings from implementation of energy conservation measures, identification and evaluation of additional energy conservation concepts, transition of successful energy conservation measures of MSC and coordination with other Navy energy conservation programs to leverage successful energy reduction approaches.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Increase result of program requirements moving from BA04 PE0408042N, National Defense Sealift Fund (NDSF) Project 3117 Naval Operational Logistics (OPLOG) Integration (FY16 and prior and FY18) to this budget for FY19 and follow. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 12.510 | 0.000 | 12.955 | 0.000 | 12.955 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603564N / *Ship Prel Design & Feasibility Studies* | **Project (Number/Name)**<br>3389 / *OPLOG IPT Development* |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • NDSF/0408042N/3117: *3117/Naval Operational Logistics Integration* | 0.000 | 11.729 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 29.656 |

**Remarks**

FY18 and out funds realigned to the NDSF appropriation BA05 PE 0408042N RDTE PRJ 3117

**D. Acquisition Strategy**

Not applicable for OPLOG R&D efforts

**E. Performance Metrics**

Annual Program Review

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603564N / *Ship Prel Design & Feasibility Studies* | **Project (Number/Name)**<br>3389 / *OPLOG IPT Development* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Primary Hardware Development | Various | VARIOUS : Various | 0.000 | 2.650 | Jan 2017 | 0.000 | | 5.357 | Jan 2019 | - | | 5.357 | Continuing | Continuing | Continuing |
| Ancillary Hardware Development | Various | VARIOUS : Various | 0.000 | 1.296 | Jan 2017 | 0.000 | | 1.500 | Jan 2019 | - | | 1.500 | Continuing | Continuing | Continuing |
| Ship Integration | Various | VAROUS : Various | 0.000 | 1.200 | Jan 2017 | 0.000 | | 0.600 | Jan 2019 | - | | 0.600 | Continuing | Continuing | Continuing |
| Ship Suitability | Various | VARIOUS : Various | 0.000 | 0.750 | Jan 2017 | 0.000 | | 0.500 | Jan 2019 | - | | 0.500 | Continuing | Continuing | Continuing |
| System Engineering | Various | VARIOUS : Various | 0.000 | 1.250 | Jan 2017 | 0.000 | | 0.940 | Jan 2019 | - | | 0.940 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 7.146 | | 0.000 | | 8.897 | | - | | 8.897 | Continuing | Continuing | N/A |

**Remarks**

Award dates reflect initial award of incremental execution.

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Development Suport | Various | VARIOUS : Various | 0.000 | 0.750 | Jan 2017 | 0.000 | | 0.900 | Jan 2019 | - | | 0.900 | Continuing | Continuing | Continuing |
| Software Development | Various | VARIOUS : Various | 0.000 | 0.000 | | 0.000 | | 0.050 | Jan 2019 | - | | 0.050 | Continuing | Continuing | Continuing |
| Integrated Logistics Support | Various | VARIOUS : Various | 0.000 | 0.300 | Jan 2017 | 0.000 | | 0.350 | Jan 2019 | - | | 0.350 | Continuing | Continuing | Continuing |
| Configuration Management | Various | VARIOUS : Various | 0.000 | 0.500 | Jan 2017 | 0.000 | | 0.400 | Jan 2019 | - | | 0.400 | Continuing | Continuing | Continuing |
| Technical Data | Various | VAROUS : Various | 0.000 | 0.800 | Jan 2017 | 0.000 | | 0.600 | Jan 2019 | - | | 0.600 | Continuing | Continuing | Continuing |
| Studies & Analysis | Various | VARIOUS : Various | 0.000 | 0.367 | Jan 2017 | 0.000 | | 0.135 | Jan 2019 | - | | 0.135 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 2.717 | | 0.000 | | 2.435 | | - | | 2.435 | Continuing | Continuing | N/A |

**Remarks**

Award dates reflect initial award of incremental execution.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603564N / *Ship Prel Design & Feasibility Studies* | **Project (Number/Name)**<br>3389 / *OPLOG IPT Development* |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Developmental Test & Evaluation | Various | VARIOUS : Various | 0.000 | 1.297 | Jan 2017 | 0.000 | | 0.700 | Jan 2019 | - | | 0.700 | Continuing | Continuing | Continuing |
| Operational Test & Evaluation | Various | VARIOUS : Various | 0.000 | 1.000 | Jan 2017 | 0.000 | | 0.573 | Jan 2019 | - | | 0.573 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 2.297 | | 0.000 | | 1.273 | | - | | 1.273 | Continuing | Continuing | N/A |

**Remarks**

Award dates reflect initial award of incremental execution.

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Contractor Engineering Support | Various | VARIOUS : Various | 0.000 | 0.100 | Jan 2017 | 0.000 | | 0.100 | Jan 2019 | - | | 0.100 | Continuing | Continuing | Continuing |
| Government Engineering Support | Various | VARIOUS : Various | 0.000 | 0.250 | Jan 2017 | 0.000 | | 0.250 | Jan 2019 | - | | 0.250 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.350 | | 0.000 | | 0.350 | | - | | 0.350 | Continuing | Continuing | N/A |

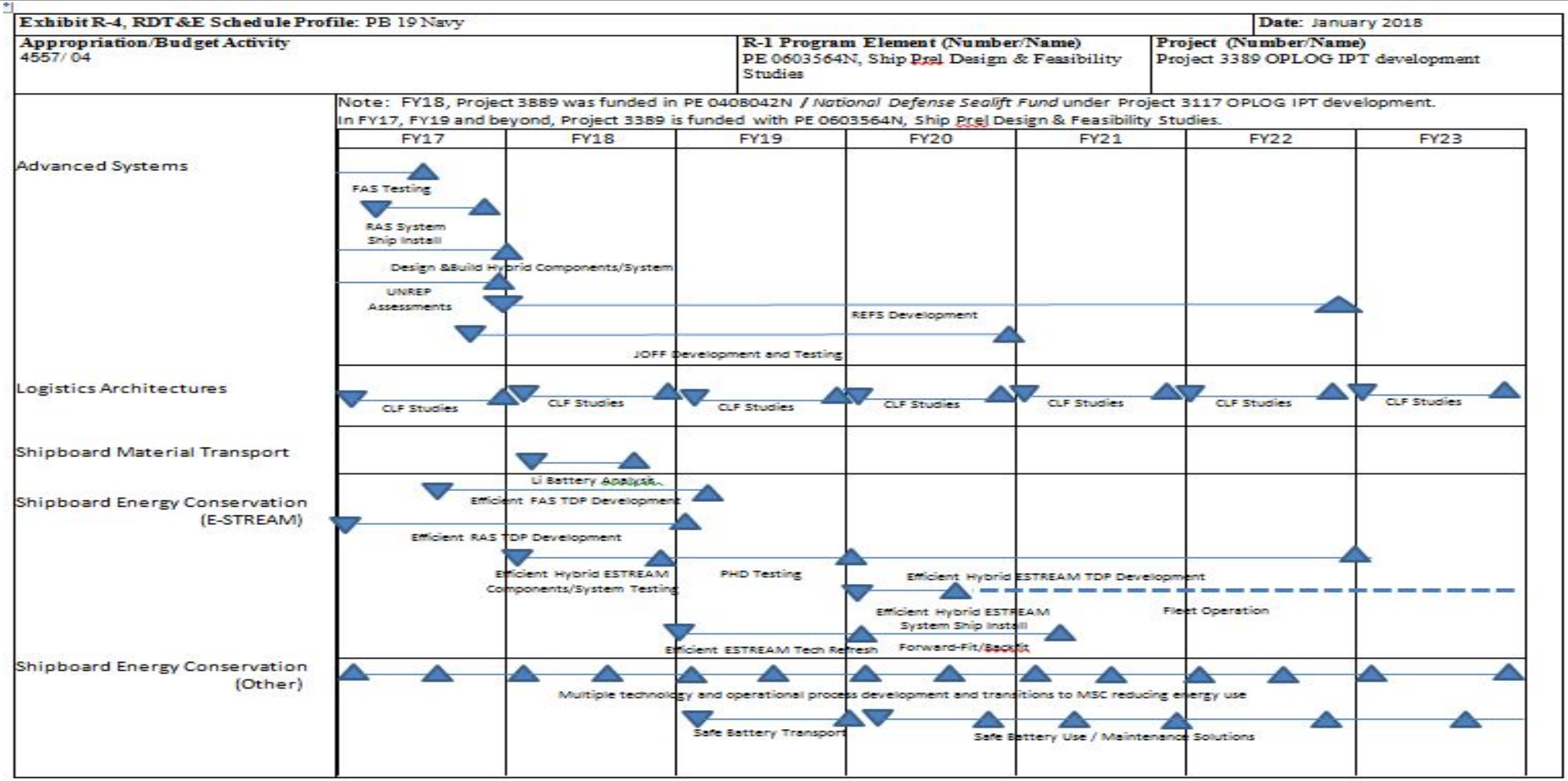
**Remarks**

Award dates reflect initial award of incremental execution.

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 12.510 | | 0.000 | | 12.955 | | - | | 12.955 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603564N / *Ship Prel Design & Feasibility Studies* | **Project (Number/Name)**<br>3389 / *OPLOG IPT Development* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603564N / *Ship Prel Design & Feasibility Studies* | **Project (Number/Name)**<br>3389 / *OPLOG IPT Development* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3389*** | | | | |
| Advanced Systems | 1 | 2017 | 4 | 2023 |
| Logistics Architectures | 1 | 2017 | 4 | 2023 |
| Shipboard Energy Conservation (E-STREAM) | 1 | 2017 | 4 | 2023 |
| Shipboard Energy Conservation (Other)) | 1 | 2017 | 4 | 2023 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603570N *I Advanced Nuclear Power Systems* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 0.000 | 453.313 | 329.500 | 256.137 | - | 256.137 | 181.650 | 149.186 | 130.625 | 133.055 | Continuing | Continuing |
| 1258: *Nuclear Technology Development* | 0.000 | 62.987 | 64.038 | 66.037 | - | 66.037 | 67.644 | 69.101 | 70.483 | 76.214 | Continuing | Continuing |
| 3219: *SBSD Nuclear Technology Development* | 0.000 | 390.326 | 265.462 | 190.100 | - | 190.100 | 114.006 | 80.085 | 60.142 | 56.841 | Continuing | Continuing |
| **Program MDAP/MAIS Code:**<br>**Project MDAP/MAIS Code(s):** P444 | | | | | | | | | | | | |

**A. Mission Description and Budget Item Justification**

The details of this program element are classified CONFIDENTIAL and are submitted annually to Congress in the classified budget justification books.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 453.313 | 329.500 | 256.146 | - | 256.146 |
| Current President's Budget | 453.313 | 329.500 | 256.137 | - | 256.137 |
| Total Adjustments | 0.000 | 0.000 | -0.009 | - | -0.009 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | - | - | | | |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -0.009 | - | -0.009 |

**Change Summary Explanation**

Technical: Not applicable.
Schedule: Not applicable.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603570N / *Advanced Nuclear Power Systems* | Project (Number/Name)<br>1258 / *Nuclear Technology Development* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1258: *Nuclear Technology Development* | 0.000 | 62.987 | 64.038 | 66.037 | - | 66.037 | 67.644 | 69.101 | 70.483 | 76.214 | Continuing | Continuing |
| Quantity of RDT&E Articles | - | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The details of this program element are classified CONFIDENTIAL and are submitted annually to Congress in the classified budget justification books.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | | | | | R-1 Program Element (Number/Name)<br>PE 0603570N / *Advanced Nuclear Power Systems* | | | | Project (Number/Name)<br>3219 / *SBSD Nuclear Technology Development* | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| 3219: *SBSD Nuclear Technology Development* | 0.000 | 390.326 | 265.462 | 190.100 | - | 190.100 | 114.006 | 80.085 | 60.142 | 56.841 | Continuing | Continuing |
| Quantity of RDT&E Articles | - | - | - | - | - | - | - | - | - | - | | |

**Project MDAP/MAIS Code:** P444

**A. Mission Description and Budget Item Justification**

The details of this program element are classified CONFIDENTIAL and are submitted annually to Congress in the classified budget justification books.

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603573N *I Advanced Surface Machinery Sys* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 195.686 | 30.255 | 29.953 | 22.109 | - | 22.109 | 21.251 | 20.799 | 21.213 | 21.667 | Continuing | Continuing |
| 2471: *Integrated Power Systems (IPS)* | 195.686 | 30.255 | 29.953 | 22.109 | - | 22.109 | 21.251 | 20.799 | 21.213 | 21.667 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

The FY 2019 funding request was reduced by $0.092 million to reflect the Department of Navy's effort to support the Office of Management and Budget directed reforms for Efficiency and Effectiveness that include a lean, accountable, more efficient government.

This Program Element (PE) includes the development of advanced surface ship hull, mechanical, and electrical (HM&E) components and systems for all future ships and back-fit ships where appropriate as well as development of Cybersecurity Boundary Defense Capabilities for HM&E systems. This PE is managed by PMS 320, the Electric Ships Office, located organizationally within PEO SHIPS, responsible for developing Naval Power and Energy Systems that focus power system integration of Directed Energy (DE) and other high powered mission systems as well as platform integration and improving energy efficiency of those components and systems. The mission of PMS 320 is to develop and provide smaller, simpler, more affordable and more capable electric power systems for all Navy platforms, focus Navy and industry investments, and reduce total ownership cost.

This PE serves as the bridge between Science and Technology (S&T) and ship platform and mission systems acquisition programs by identifying prospective applications for S&T research, advanced development, and performing additional product development and qualification when necessary to meet platform or mission system requirements. This PE also includes HM&E cybersecurity Boundary Defense Capability (BDC) development. The HM&E systems to be protected from cyber-attack by BDC include Machinery Control Systems, Electric Power Systems, Damage Control and Firefighting, Auxiliary Machinery and Fluid Systems, Engines and Power Transmission Systems, Gas Turbine Systems, Video Systems, as well as other HM&E systems. Cybersecurity BDC will allow the ship to better protect, detect, respond, and recover from a cyber attack.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | Date: February 2018 |
|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | R-1 Program Element (Number/Name)<br>PE 0603573N *I Advanced Surface Machinery Sys* | | |
| **B. Program Change Summary ($ in Millions)** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** |
| Previous President's Budget | 36.655 | 29.953 | 22.596 | - | 22.596 |
| Current President's Budget | 30.255 | 29.953 | 22.109 | - | 22.109 |
| Total Adjustments | -6.400 | 0.000 | -0.487 | - | -0.487 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -0.604 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | -0.092 | - | -0.092 |
| • Rate/Misc Adjustments | 0.001 | 0.000 | -0.395 | - | -0.395 |
| • Congressional Directed Reductions Adjustments | -5.797 | - | - | - | - |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603573N / *Advanced Surface Machinery Sys* | Project (Number/Name)<br>2471 / *Integrated Power Systems (IPS)* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2471: *Integrated Power Systems (IPS)* | 195.686 | 30.255 | 29.953 | 22.109 | - | 22.109 | 21.251 | 20.799 | 21.213 | 21.667 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

This project supports the development and transition of Naval Power and Energy Systems including power generation, power conversion, power distribution, energy storage, power utilization and automation and control functions for fully integrated electric propulsion (such as T-AKE -1 class or DDG 1000 class), hybrid electric propulsion (such as LHD 8 and LHA(R) class), as well as legacy mechanical propulsion ships (such as DDG51 class). This project supports optimized integration of Directed Energy (DE) and other high powered mission systems, appropriate component and system controls, integration of components and systems into future and current ships, and providing power and energy system solution alternatives to new and existing platforms. Existing ships' power systems require optimized integration via energy storage and advanced controls techniques to withstand the effects of DE and other high powered mission systems and avoid negative impacts to power generating equipment (diesel/gas turbine engines and generators).

Project developments are aligned with the Navy's 30 year shipbuilding plan via the Naval Power and Energy Systems Technology Development Roadmap (TDR), which outlines the way ahead for future developments and provides a basis for coordinated planning and investment by the Navy and private industry.

This project develops and transitions products that electrically integrate and provide power to mission systems, integrates those components and systems into ship platforms, increases energy efficiency, and provides cybersecurity capabilities for current in-service Hull, Mechanical and Electrical (HM&E) systems as well as future systems.

The systems developed by this Project are by their very nature the foundation of the ships kill chain, and are developed with efficiency requirements as part of total life cycle cost minimization. Efforts within Power and Energy Systems are to design, develop, test and integrate shipboard power systems to incorporate advanced sensors, directed energy and other advanced weapons. Design and testing includes modeling and simulation, as well as land based testing, to reduce risk and demonstrate readiness for shipboard use.

Cybersecurity: Develops an approach to implement a cybersecurity Boundary Defense Capability (BDC) for HM&E control systems on surface ships. The HM&E systems to be protected from cyber-attack by BDC include machinery control systems, electric power systems, damage control and firefighting, auxiliary machinery and fluid systems, engines and power transmission systems, gas turbine systems, video systems, as well as other HM&E systems. Design and technical data packages for software and hardware solutions will be developed. Cybersecurity BDC will allow the ship to better protect, detect, respond, and recover from cyber-attack.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Power and Energy Systems | 16.999 | 16.024 | 13.241 | 0.000 | 13.241 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603573N / *Advanced Surface Machinery Sys* | **Project (Number/Name)**<br>2471 / *Integrated Power Systems (IPS)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Complete manufacture and Factory Acceptance Testing (FAT) and deliver the 4.2MW AG9160RF Gas Turbine Generator (GTG) to the Naval Surface Warfare Center (NSWC) - Philadelphia, PA for DDG51 Flight III electrical integration testing. The AG9160RF Gas Turbine Generator (GTG) is an upgrade to the DDG1000 auxiliary gas turbine and will provide increased power to meet DDG51 Flight III requirements for advanced sensors and future weapons with reduction in life cycle costs through increased fuel efficiency over legacy gas turbine generator sets.<br><br>Conduct First Article Test and Power Hardware in the Loop (PHIL) testing at Florida State University Center for Advanced Power Systems (FSU CAPS) on Air and Missile Defense Radar (AMDR) Power Conversion Modules (PCM) Low Rate Initial Power (LRIP) units. Complete Environmental Qualification Test (EQT) and support delivery and installation of AMDR PCM LRIP units for PCM / AMDR combat system integration testing. Deliver AMDR PCM LRIP units to DDG51 Flight III land based test site. Continue to provide support for AMDR PCM units during PCM / AMDR combat system integration testing and electrical system validation testing at the DDG 51 Flight III test sites. AMDR PCM provides power conversion from ship's 4160 Volts Alternating Current (VAC) distribution systems to 1000 Volts Direct Current (VDC) to support the AMDR on DDG 51 Flight III Class Ships.<br><br>Continue planning for future gas turbine operational readiness and fuel efficiency upgrades.<br><br>In order to obtain early insight into the effects of high power and energy mission systems on ships electric power systems, evaluate shipboard power and energy systems, and evaluate power system performance at lower cost than full-scale hardware system testing, simulated electrical system integration testing using power and energy system components will be conducted at the Center for Advanced Power System at Florida State University (FSU CAPS). This lower-cost approach to testing is referred to as Power Hardware In the Loop (PHIL). PHIL includes development of component computer models that simulate and emulate actual operating machinery components and shipboard power and energy systems. PHIL testing replaces component models with hardware once hardware development is complete. PHIL testing costs less than full-scale hardware system testing, shortens development time, and affords the opportunity to identify and mitigate risks in a deliberate fashion from specification development to computer model development to hardware development resulting in a more affordable and robust end product. PHIL testing reduces developmental risk, and demonstrates performance potential prior to live hardware integration testing. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603573N / *Advanced Surface Machinery Sys* | **Project (Number/Name)**<br>2471 / *Integrated Power Systems (IPS)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Receive, install, check-out, and integrate the Energy Storage Module (ESM) prototype into the test site at FSU CAPS. Conduct PHIL testing of the ESM prototype to demonstrate Energy Magazine (EM). Energy Magazine (EM) serves as the energy resource to enable the introduction of pulsed high power and energy weapons and sensor systems by providing a buffered interface between legacy power systems and new generation weapons and sensors. (Note: The ESM prototype will be tested at FSU CAPS and results will be exchanged with the United Kingdom (UK) Ministry of Defence (MOD) via the Advanced Electrical Power and Propulsion Project (AEP3) Project Arrangement and the OSD Coalition Warfare Program (CWP) Directed Energy Power Systems (DEPS) project.)<br><br>Conduct PHIL testing of emulated high powered weapons and sensors into ships electrical systems at FSU CAPS. Complete simulated electrical system integration testing of multiple pulsed mission systems integrated into a single branch of a ship's power system in stressing scenarios requiring controlled power flow.<br><br>Complete simulated electrical system integration testing of multiple pulsed mission systems along with a large sensor load integrated into a new notional Medium Voltage Direct Current (MVDC) Integrated Power & Energy System (IPES) architecture, focused on demonstrating fault detection and isolation utilizing new MVDC circuit breakers developed by ONR and transitioning to PMS 320. IPES adds distributed EM functionality and advanced cyber safe controls to the Integrated Power System of ships such as DDG1000 for enhanced survivability, efficient sharing of power and energy resources between ship propulsion, mission systems and ship service loads.<br><br>Conduct design review of the ESM prototype for use in Stable Backup Power (SBP) applications, identify necessary modifications required and appropriate test configurations. Evaluate ESM prototype for use in providing shipboard energy storage to reduce individual component Uninterruptible Power Supply (UPS) systems.<br><br>Continue to refine real time simulation models of various ship classes to reflect learning and state of ongoing development of power and energy system components and pulsed, high power and energy weapons and sensor systems (i.e. Directed Energy Weapons, e.g. laser).<br><br>Complete planning for FY 19 simulated electrical system integration testing using real time power hardware in the loop at FSU CAPS. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603573N / *Advanced Surface Machinery Sys* | **Project (Number/Name)**<br>2471 / *Integrated Power Systems (IPS)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Continue to develop performance specification and required attributes for next generation compact high power Advanced Power Generation Module (APGM). Develop computer component models and commence system level modeling and simulation efforts. | | | | | |
| ***FY 2019 Base Plans:***<br>Increased warfighting capabilities using pulsed high power and energy weapons and sensors (i.e., lasers, advanced radars, etc.) require shipboard energy storage systems to buffer the interface between legacy ship electric distribution systems and the power and energy requirements of new generation weapons and sensors. Prior to FY19, this PE has designed, built, and tested the Energy Storage Module (ESM) prototype. Lessons learned from ESM prototype development are being incorporated into the Energy Magazine (EM), an energy storage system with advanced controls, to serve as the energy resource to enable the introduction of pulsed high power and energy weapons and sensor systems. When fully integrated, EM is expected to also reduce the number of Uninterruptable Power Supply (UPS) on ships which decreases maintenance and costs.<br><br>The EM energy storage system includes power electronics, controls, power conversion components, and energy storage media. Pulsed high power and energy weapons and sensors require different levels of power and energy storage devices with system specific dynamic interfaces (how quickly power/energy is required). As part of EM development, this PE is pursuing a variety of energy storage media and a common interface to these various storage media for ease of inter-operability in the future. Examples of energy storage media include batteries (i.e., lithium iron phosphate), capacitors, ultra-capacitors, and flywheels.<br><br>Develop and deliver executable models and an EM Model Description Document (MDD) that capture the behavior of the system, conduct control system analysis, generate detailed interface requirements, and generate test scenarios and sequences. Continue development of an EM software control system emulator to validate the performance and interfaces of the EM controls. Begin acquiring hardware, fabricate assemblies, and commence component level testing and assembly of the EM prototype unit. The hardware includes the storage media, power electronics, interconnecting cabling, and associated equipment.<br><br>Prepare for the future transition of Advanced Controls developed by ONR's Robust Combat Power Control Future Naval Capability (FNC) to this PE in FY21. Advanced Controls take full advantage of power and energy resources within the ship's machinery control system to deliver mission systems the power and energy they require when required. Advanced controls configure the system to operate at max efficiently when appropriate | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603573N / *Advanced Surface Machinery Sys* | **Project (Number/Name)**<br>2471 / *Integrated Power Systems (IPS)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| and switch to max performance when necessary though three-way communication and control between the machinery control system, mission planning and pulsed high power and energy weapon systems and sensors.<br><br>This PE has developed a low-cost approach to testing, referred to as PHIL, which employs computer models that simulate and emulate actual operating machinery components and shipboard power and energy systems. PHIL testing replaces component models with hardware once hardware development is complete. PHIL testing costs less than full-scale hardware system testing, shortens development time, and affords the opportunity to identify and mitigate risks in a deliberate fashion from specification development to computer model development to hardware development resulting in a more affordable and robust end product. PHIL testing provides early insight into the effects of high power and energy mission systems (i.e., laser, advanced radars, etc.) on a ship's electric power system, evaluates shipboard power and energy systems, and evaluates power system performance. The PHIL test site is located at Florida State University's Center for Advanced Power System (FSU CAPS). PHIL testing at FSU CAPS has been ongoing since FY17. Eight different PHIL demonstrations were planned with 5 to be completed through FY18 and 3 planned in FY19. PHIL demonstrations to date have replaced component models with the United Kingdom's Flywheel Energy Storage System (FESS), the ESM prototype unit developed by this PE, and Advanced Circuit Protection Devices developed by ONR. The purpose of the FY19 demonstrations is to focus on DDG 51 FLT III and Future Surface Combatants with multiple high pulsed power loads; and to de-risk EM, advanced electrical architectures, power conversion equipment, and controls for implementation into an Integrated Power and Energy System (IPES).<br><br>Conduct feasibility studies, cost based assessments, and begin developing technical and performance specifications for an Integrated Power & Energy System (IPES) in support of future surface combatant and mission system power and energy requirements. Identify shared energy storage and advanced controls requirements enabling an affordable, scalable and flexible power system to meet current and future needs. Refine IPES notional architectures and risk assessments through studies and industry engagement. Draft performance specifications for IPES system, equipment and components. Develop computer component models and commence system level modeling and simulation efforts. Plan for land based testing activities.<br><br>Continue planning for future gas turbine operational readiness and fuel efficiency upgrades.<br><br>Continue to define performance requirements, explore trade space in next generation compact high power Advanced Power Generation Modules (APGM), develop characterization data used to conduct ship design studies and to establish a benchmark for performance comparison, develop a stand-alone technical description | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603573N / *Advanced Surface Machinery Sys* | **Project (Number/Name)**<br>2471 / *Integrated Power Systems (IPS)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| document which describes performance characteristics, evaluate the effect of large pulse loads from future electric weapons on the cycle life of gas turbine engines, and engine capability to respond to such pulse loads without an unacceptable reduction in time between overhaul.<br><br>Conduct feasibility studies, Cost Based Assessments, and begin developing performance and technical specifications for next generation compact high power Advanced Power Conversion Module (APCM) incorporating high band gap materials such as silicon carbide. Develop computer component models and commence system level modeling and simulation efforts.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Decrease from FY 2018 to FY 2019 is due to transitioning to production mission critical hardware for DDG 51 Flight III (AG9160RF Gas Turbine Generator (GTG) and AMDR PCMs). | | | | | |
| ***Title:*** Naval Power Technology Development / Platform Integration & Transition | 1.104 | 1.104 | 1.104 | 0.000 | 1.104 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Continue to execute the Advanced Electric Power and Propulsion Systems Development Project ((short title is AEP3), Project Arrangement (PA) ref DoD-MOD-N-12-0001 which is an agreement between the US and UK Governments to cooperate on a scope of work associated with characterizing, developing, modeling, and de-risking electrical power and propulsion system architectures and equipment for future surface and submarine platforms to meet the needs of both Navies. Complete execution of PA complimentary effort (Directed Energy Power Systems (DEPS)) under the Coalition Warfare Program (CWP).<br><br>Continue to develop power and propulsion system configurations in support of future surface ship acquisition programs. Develop alternative power and propulsion solutions for future surface combatants and amphibious ships. Continue to improve baseline power system performance by performing analysis, modeling and simulation, life cycle cost analysis, producibility studies, module development, and ship integration studies and planning. Continue to analyze alternatives for supplying power to advanced radars, combat systems, and electric weapons power demands and potential interfaces to develop optimum alternative solutions. Continue assessments of Naval Power and Energy System alternate architectures to best meet emerging ship requirements. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603573N / *Advanced Surface Machinery Sys* | **Project (Number/Name)**<br>2471 / *Integrated Power Systems (IPS)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Complete biennial update of the Naval Power and Energy Systems (NPES) Technology Development Roadmap (TDR). Support maturation and transition of ONR Future Naval Capabilities (FNC) products to meet NPES TDR identified gaps.<br><br>Continue to support maturation and transition of ONR Future Naval Capabilities (FNC) products to meet NPES TDR identified gaps.<br><br>Continue Combat Power and Energy System Overarching Integrated Product Team (OIPT).<br><br>Continue to generate strategy, technology development plan and resource requirements for future surface combatant integrated power and energy system.<br><br>***FY 2019 Base Plans:***<br>Continue to execute the Advanced Electric Power and Propulsion Systems Development Project (short title is AEP3), Project Arrangement (PA) ref DoD-MOD-N-12-0001 which is an agreement between the US and UK Governments to cooperate on a scope of work associated with characterizing, developing, modeling, and de-risking electrical power and propulsion system architectures and equipment for future surface and submarine platforms to meet the needs of both Navies.<br><br>Continue to develop power and propulsion system configurations in support of future surface ship acquisition programs. Develop alternative power and propulsion solutions for future surface combatants and amphibious ships. Continue to improve baseline power system performance by performing analysis, modeling and simulation, life cycle cost analysis, producibility studies, module development, and ship integration studies and planning. Continue to analyze alternatives for supplying power to advanced radars, combat systems, and electric weapons power demands and potential interfaces to develop optimum alternative solutions. Continue assessments of Naval Power and Energy System alternate architectures to best meet emerging ship requirements.<br><br>Commence biennial update of the Naval Power and Energy Systems (NPES) Technology Development Roadmap (TDR). | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603573N / *Advanced Surface Machinery Sys* | **Project (Number/Name)**<br>2471 / *Integrated Power Systems (IPS)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Continue to support maturation and transition of ONR Future Naval Capabilities (FNC) products to meet NPES TDR identified gaps.<br><br>Support transition from ONR of Silicon Carbon (and other high bandgap semiconductor materials) based power electronic modules. High band gap semiconductor materials operate at high speeds and temperatures as compared with silicon based materials affording more compact, thermally tolerant power conversion equipment making them highly desirable for naval applications.<br><br>Continue Combat Power and Energy System Overarching Integrated Product Team (OIPT).<br><br>Continue to generate strategy, technology development plan and resource requirements for future surface combatant integrated power and energy system.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>There is no increase or decrease to the funding level between FY18 and FY19. Continue to execute requirements as outlined in the FY 2018 and FY 2019 plans. | | | | | |
| ***Title:*** Cybersecurity Boundary Defense Capability | 12.152 | 12.825 | 7.764 | 0.000 | 7.764 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY 2018 plans will include the testing of the Cybersecurity Boundary Defense Capability (BDC) in Navy land based site laboratories and on combatants and amphibious ships as non-permanent changes. The intent of the testing is to demonstrate the overall approach to implement a cybersecurity boundary defense capability for Hull, Mechanical and Electrical (HM&E) control systems on surface ships as being an effective approach. HM&E systems to be protected will include Machinery Control Systems, Electric Power Systems, Damage Control and Firefighting, Auxiliary Machinery and Fluid systems, Engines and Power Transmission Systems, Gas Turbine Systems, Video Systems as well as other HM&E systems. Design and technical data packages for software and hardware solutions will be developed. The intent of the total boundary defense capability will be to allow the ship to better protect, detect, respond, and recover from potential cyber attacks on the HM&E enclave on surface ships<br>***FY 2019 Base Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603573N / *Advanced Surface Machinery Sys* | **Project (Number/Name)**<br>2471 / *Integrated Power Systems (IPS)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| The FY19 plans will include the continued detailed development testing and system integration of the common Cybersecurity Boundary Defense Capability (BDC) for H,M&E systems to be applied across multiple ship classes. This capability will include both a BDC capability and cyber situational awareness tools for the H,M&E systems. HM&E systems to be protected will include Machinery Control Systems, Electric Power Systems, Damage Control and Firefighting, Auxiliary Machinery and Fluid systems, Engines and Power Transmission Systems, Gas Turbine Systems, Video Systems as well as other HM&E systems. Design and technical data packages for software and hardware solutions will be developed. The intent of the total boundary defense capability will be to allow the ship to better protect, detect, respond, and recover from potential cyber attacks on the HM&E enclave on surface ships.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Decrease from FY 2018 to FY 2019 is due to transitioning to production. Cybersecurity Boundary Defense Capability (BDC) was funded in FY 2016 in PE: 0604567N / PU 1803 to establish the infrastructure and detailed plans to fully execute Cybersecurity starting 1 Oct 16. FY 2017-2021 cybersecurity efforts are budgeted in PE 0603573N / PU 2471. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 30.255 | 29.953 | 22.109 | 0.000 | 22.109 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

This program develops and transitions higher performance and more affordable electric power and propulsion systems to both new construction and back fit ship applications using an evolutionary acquisition approach. For new contract awards, full and open competition is utilized to the maximum extent possible to provide maximum benefit to the Navy at the lowest possible cost to the taxpayer. When able to meet Navy requirements, commercial technology is leveraged to further minimize cost to the Navy. Cybersecurity efforts will maximize use of government field activity labs and already contracted HM&E equipment vendors.

**E. Performance Metrics**

This project will execute 100% of the signed Technology Transition Agreements with ONR; complete 100% of the advanced developments currently planned for the Energy Storage Module and Power Generation Module; achieve up to 10% Specific Fuel Consumption (SFC) improvement for Advanced Power Generation Module; mature technology to Technology Readiness Level (TRL) 6 by milestone decisions for ship acquisition program; and, complete HM&E cybersecurity studies and

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603573N / *Advanced Surface Machinery Sys* | **Project (Number/Name)**<br>2471 / *Integrated Power Systems (IPS)* |

production of a boundary defense capability architecture and implementation approach for HM&E systems on surface ships in alignment with the Task Force Cyber Awareness (TFCA) goals.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603573N / *Advanced Surface Machinery Sys* | **Project (Number/Name)**<br>2471 / *Integrated Power Systems (IPS)* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Product Development | SS/FFP | Rolls Royce : Walpole, MA | 33.006 | 3.391 | Oct 2016 | 1.506 | Oct 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Product Development | SS/BOA | General Electric Company : Cincinatti, OH | 3.560 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Product Development | C/FFP | DRS : DRS, Milwaukee WI | 40.677 | 5.256 | Dec 2016 | 5.345 | Dec 2017 | 5.118 | Oct 2018 | - | | 5.118 | Continuing | Continuing | Continuing |
| Product Development | C/CPFF | Various : Various | 38.224 | 3.529 | Oct 2016 | 4.747 | Oct 2017 | 4.722 | Oct 2018 | - | | 4.722 | Continuing | Continuing | Continuing |
| Product Development | WR | NSWCPD : Phila, PA | 52.127 | 4.340 | Oct 2016 | 4.530 | Oct 2017 | 3.505 | Oct 2018 | - | | 3.505 | Continuing | Continuing | Continuing |
| Cybersecurity BDC | WR | NSWCPD : Phila, PA | 0.000 | 4.223 | Oct 2016 | 5.400 | Nov 2017 | 3.353 | Nov 2018 | - | | 3.353 | Continuing | Continuing | Continuing |
| Cybersecurity BDC | C/CPIF | Boeing : Huntington Beach, CA | 0.000 | 0.700 | Jun 2017 | 0.700 | Jan 2018 | 0.500 | Feb 2019 | - | | 0.500 | Continuing | Continuing | Continuing |
| Cybersecurity BDC | C/FP | Various HM&E Equipment Vendors : Various | 0.000 | 1.998 | Mar 2017 | 3.000 | Jan 2018 | 0.500 | Jan 2019 | - | | 0.500 | Continuing | Continuing | Continuing |
| Cybersecurity BDC | C/CPIF | Various : Various | 0.000 | 3.000 | Apr 2017 | 0.250 | Jan 2018 | 0.700 | Jan 2019 | - | | 0.700 | Continuing | Continuing | Continuing |
| Product Development | WR | Various Govt : Various | 0.000 | 0.633 | Jan 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.633 | - |
| Cybersecurity BDC | C/CPFF | JHU APL : Laurel, MD | 0.000 | 2.231 | Mar 2017 | 3.475 | Jan 2018 | 2.711 | Dec 2018 | - | | 2.711 | 0.000 | 8.417 | - |
| | | **Subtotal** | 167.594 | 29.301 | | 28.953 | | 21.109 | | - | | 21.109 | Continuing | Continuing | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Test and Evaluation | WR | NSWCCD-SSES : Phila, PA | 24.954 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 24.954 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603573N / *Advanced Surface Machinery Sys* | **Project (Number/Name)**<br>2471 / *Integrated Power Systems (IPS)* |

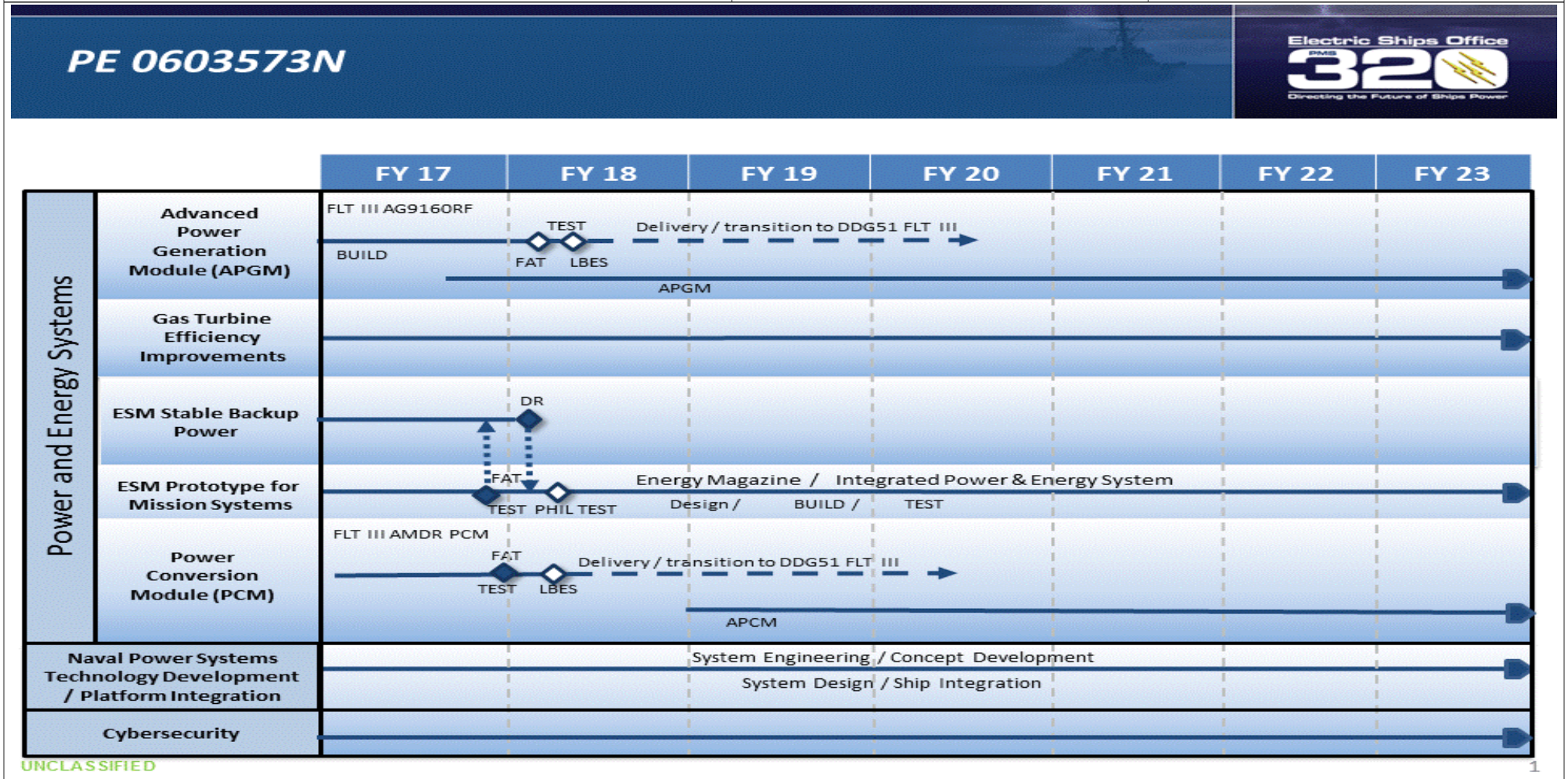
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Management | C/CPFF | Herren Associates : Alexandria, VA | 3.138 | 0.954 | Feb 2017 | 1.000 | Dec 2017 | 1.000 | Oct 2018 | - | | 1.000 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 3.138 | 0.954 | | 1.000 | | 1.000 | | - | | 1.000 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 195.686 | 30.255 | | 29.953 | | 22.109 | | - | | 22.109 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603573N / *Advanced Surface Machinery Sys* | **Project (Number/Name)**<br>2471 / *Integrated Power Systems (IPS)* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603573N / *Advanced Surface Machinery Sys* | **Project (Number/Name)**<br>2471 / *Integrated Power Systems (IPS)* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 2471*** | | | | |
| Power and Energy Systems | 1 | 2017 | 4 | 2023 |
| Naval Power Technology Development / Platforms Integration & transition | 1 | 2017 | 4 | 2023 |
| Cybersecurity BDC | 1 | 2017 | 4 | 2023 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603576N *I (U)CHALK EAGLE* |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Program Element | 0.000 | 353.146 | 191.610 | 29.744 | - | 29.744 | 53.022 | 60.105 | 71.656 | 73.275 | Continuing | Continuing |
| 1578: *Chalk Eagle* | 0.000 | 353.146 | 191.610 | 29.744 | - | 29.744 | 53.022 | 60.105 | 71.656 | 73.275 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

This program is reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 367.016 | 191.610 | 30.713 | - | 30.713 |
| Current President's Budget | 353.146 | 191.610 | 29.744 | - | 29.744 |
| Total Adjustments | -13.870 | 0.000 | -0.969 | - | -0.969 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -13.739 | 0.000 | | | |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -0.969 | - | -0.969 |
| • Congressional General Reductions Adjustments | -0.131 | - | - | - | - |

**Change Summary Explanation**

Technical: Not applicable.
Schedule: Not applicable.

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603581N *I (U)LITTORAL COMBAT SHIP* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 1,288.069 | 50.806 | 40.991 | 27.997 | - | 27.997 | 12.577 | 7.571 | 0.893 | 0.915 | Continuing | Continuing |
| 3096: *Littoral Combat Ship* | 1,279.984 | 28.690 | 20.841 | 12.220 | - | 12.220 | 10.424 | 5.823 | 0.000 | 0.000 | 0.000 | 1,357.982 |
| 4506: *LCS Training* | 8.085 | 22.116 | 20.150 | 15.777 | - | 15.777 | 2.153 | 1.748 | 0.893 | 0.915 | Continuing | Continuing |
| **Program MDAP/MAIS Code:**<br>**Project MDAP/MAIS Code(s):** 374 | | | | | | | | | | | | |

**A. Mission Description and Budget Item Justification**

The FY 2019 funding request was reduced by $3.154 million to account for the availability of prior year execution balances.

The FY 2019 funding request was reduced by $0.267 million to reflect the Department of Navy's effort to support the Office of Management and Budget directed reforms for Efficiency and Effectiveness that include a lean, accountable, more efficient government.

This Program Element (PE) provides funds for detailed design, development, construction, issue resolution, certification, integration, and testing of the Littoral Combat Ship (LCS). LCS operates with focused-mission packages that deploy manned and unmanned vehicles to execute a variety of missions, including anti-submarine warfare (ASW), surface warfare (SUW), and mine countermeasures (MCM). LCS also possesses inherent capabilities, regardless of the mission package installed, including intelligence/surveillance/reconnaissance (ISR), maritime interdiction/interception operations (MIO), anti-terrorism/force protection (AT/FP), air warfare self-defense, joint littoral mobility, and logistic support for movement of personnel and supplies. This relatively small, shallow-draft, high-speed surface combatant complements the U.S. Navy's Surface Fleet by operating in environments where it is impossible or undesirable to employ larger, deeper-draft, multi-mission ships. LCS can deploy independently to overseas littoral regions or remain on station for extended periods of time either with a battle group or through a forward-basing arrangement. LCS will operate with Carrier Strike Groups, Surface Action Groups, or independently as dictated by the mission and environment. Additionally, LCS can operate cooperatively with the U.S. Coast Guard and Allies.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | Date: February 2018 |
|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | R-1 Program Element (Number/Name)<br>PE 0603581N *I (U)LITTORAL COMBAT SHIP* | | |
| **B. Program Change Summary ($ in Millions)** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** |
| Previous President's Budget | 51.630 | 40.991 | 34.428 | - | 34.428 |
| Current President's Budget | 50.806 | 40.991 | 27.997 | - | 27.997 |
| Total Adjustments | -0.824 | 0.000 | -6.431 | - | -6.431 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -0.824 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | -6.003 | - | -6.003 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -0.428 | - | -0.428 |

**Change Summary Explanation**

In FY19, $2.582M was reduced for Surface to Surface Mission Module (SSMM) Testing Support and $3.154M was reduced from the FY19 funding request to account for the availability of prior year execution. Additional adjustments include $0.267M for process improvement to increase efficiency in military spending and rate adjustments.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603581N / *(U)LITTORAL COMBAT SHIP* | Project (Number/Name)<br>3096 / *Littoral Combat Ship* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3096: *Littoral Combat Ship* | 1,279.984 | 28.690 | 20.841 | 12.220 | - | 12.220 | 10.424 | 5.823 | 0.000 | 0.000 | 0.000 | 1,357.982 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Project MDAP/MAIS Code:** 374

**A. Mission Description and Budget Item Justification**

The RDT&E portion of the LCS Program comprises design and development efforts required to field the LCS Class Ships, including integration with the Mission Packages (MCM, ASW and SUW) activities both pre- and post-delivery. It includes the design and development effort required to support the introduction and deployment of a Flight 0+ baseline (LCS 3/4 and Follow) with incorporation of lessons learned from the design and construction of USS Freedom (LCS 1) and USS Independence (LCS 2). Additionally, it includes design, development, issue resolution, certification and testing efforts required to support the design baseline for the six year block buy in FY10-15. This baseline will include lessons learned from the LCS 1 through LCS 4.

The LCS design and development phases include platform design and development, experimentation, ship system design and integration, hull platform testing, development of Technical Data Packages (TDPs), total ship system engineering and integration, combat systems and warfare systems certification, and planning and conduct of system testing. These efforts include procurement of combat and warfare system elements and/or simulators to support production representative testing in support of design, development, and certification efforts and ordnance in support of testing.

The RDT&E portion of LCS funding also comprises formal Developmental and Operational Assessment testing of the LCS Ships and Mission Packages. Test and Evaluation (T&E) will concentrate on verifying integration and interoperability of employed technologies and systems in the LCS seaframe designs and modular mission packages to achieve the mission capabilities and performance requirements as defined in the LCS program's Flight 0 and Flight 0+ Capabilities Development Documents (CDD). T&E functions will include the evaluation of Critical Technical Parameters (CTP), Measures of Effectiveness (MOE), Measures of Suitability (MOS), and Key Performance Parameters (KPP) for the core seaframe and the focused missions.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** LCS System-of-Systems Development, Engineering & Experimentation | 17.780 | 15.209 | 9.792 | 0.000 | 9.792 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Provides for LCS Program systems engineering in support of Flight 0, Flight 0+, the FY10 Block Buy baseline design, and future procurement baseline design, development, certification, and production (including ship system design and integration); combat system and C4I design, integration, and test; aviation (manned and unmanned) integration; modular mine countermeasure (MCM), anti-submarine warfare (ASW), and surface warfare (SUW) mission package (MP) integration; logistics product development; and various systems engineering activities required to perform risk analyses of new design and production technology concepts. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603581N / *(U)LITTORAL COMBAT SHIP* | **Project (Number/Name)**<br>3096 / *Littoral Combat Ship* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***FY 2018 Plans:***<br>Analyze data from the full ship model test of the Independence hull and provide technical evaluations of results. Provide systems engineering support for Air Defense test planning and execution on the Self Defense Test Ship in support of Probability of Raid Annihilation (PRA) on the Independence Variant. Provide systems engineering support for MCM integration testing on the Freedom and Independence Variants. Conduct analyses to qualify a lower cost, lighter weight thermal insulation on the Independence Variant.<br><br>Provide systems engineering support for VTUAV Initial Operational Test & Evaluation (IOT&E) on Independence Variant and complete VTUAV Dynamic Interface testing on the Freedom Variant. Provide Seaframe and Mission Systems engineering support to investigate, design, and develop technical solutions for design scope on both Freedom and Independence Variants. Provide Seaframe and Mission Systems engineering support to certify equipment to include oversight of design changes required for any re-certification. Finalize technical and performance baseline for future ship procurements based on systems design and testing execution. Continue conducting studies in support of development of future technical and performance baseline design upgrades.<br>***FY 2019 Base Plans:***<br>Provide systems engineering support for Seaframe and MCM integration testing and DT on the Independence Variant. Provide systems engineering support for MCM DT on the Independence Variant. Provide systems engineering support for Seaframe and ASW MP DT TECHEVAL & IOT&E on the Freedom Variant. Provide systems engineering support for Torpedo Defense Mission Module (TDMM) integration testing on the Freedom and Independence Variants. Provide systems engineering support for Gun Missile Module (GMM), Surface to Surface Mission Module (SSMM) TECHEVAL, and Operation Test (OT) on the Freedom Variant.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>The $5.417M decrease from FY 2018 to FY 2019 is due to the winding down of the test program. | | | | | |
| ***Title:*** LCS Test & Evaluation | 10.910 | 5.632 | 2.428 | 0.000 | 2.428 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Execute formal LCS DT/OT, including Live Fire Test & Evaluation (LFT&E), and procurement of T&E Ordnance. Execute DT and C4I integration and testing, aviation integration (manned and unmanned), MCM, ASW, and SUW MP integration. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603581N / *(U)LITTORAL COMBAT SHIP* | **Project (Number/Name)**<br>3096 / *Littoral Combat Ship* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***FY 2018 Plans:***<br>Complete Air Defense Test for Self Defense Test Ship. Begin planning for Air Defense Seaframe testing in support of PRA on the Independence Variant. Conduct VTUAV Dynamic Interface testing on the Freedom Variant. Conduct VTUAV IOT&E on the Independence Variant. Continue work on FSAR. Conduct Assessment and Identification of Mine Susceptibility (AIMS), Advanced Degaussing (ADG), and Advanced Mine Simulation System (AMISS) testing on the Freedom Variant. Conduct AIMS and AMISS testing on the Independence Variant. Complete post FSST availability on LCS 5 and LCS 6. Complete DDISAR for LCS Freedom Variant. Complete DDISAR for Independence Variant.<br>***FY 2019 Base Plans:***<br>Begin MCM DT through TECHEVAL on the Independence Variant. Conduct SUW DT efforts on Independence Variant. Conduct ASW DT on the Freedom Variant. Complete work on FSAR. Complete Air Defense Seaframe testing in support of PRA on the Independence Variant. Conduct Seaframe and SUW MP SSMM DT, TECHEVAL, and IOT&E on the Freedom Variant.<br>***FY 2019 OCO Plans:***<br>NA<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>The $3.204M decrease from FY 2018 to FY 2019 is due to the removal of the Surface to Surface Mission Module (SSMM) test and prior year under-execution reduction. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 28.690 | 20.841 | 12.220 | 0.000 | 12.220 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • SCN/2127: *Littoral Combat Ship (LCS)* | 1,649.692 | 1,162.936 | 749.428 | - | 749.428 | 1,228.176 | 849.087 | 1,791.867 | 1,791.996 | 3,768.664 | 24,792.911 |
| • OPN/1600: *LCS Common Mission Modules Equipment* | 14.670 | 34.666 | 46.732 | - | 46.732 | 51.553 | 36.657 | 55.776 | 29.787 | 734.284 | 1,427.898 |
| • OPN/0944: *LCS Class Support Equipment* | 43.819 | 47.955 | 47.241 | - | 47.241 | 56.761 | 65.065 | 66.341 | 67.725 | 0.000 | 519.591 |
| • OPN/1601: *LCS MCM Mission Modules* | 29.724 | 55.870 | 124.147 | - | 124.147 | 204.324 | 245.108 | 227.068 | 234.109 | 1,501.531 | 2,771.262 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603581N / *(U)LITTORAL COMBAT SHIP* | **Project (Number/Name)**<br>3096 / *Littoral Combat Ship* |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • OPN/1603: *LCS SUW Mission Modules* | 21.064 | 52.960 | 26.006 | - | 26.006 | 26.566 | 15.342 | 15.711 | 52.511 | 5.104 | 315.024 |
| • RDTEN/3129: *LCS Mission Package Development* | 153.595 | 116.871 | 8.899 | - | 8.899 | 10.311 | 9.356 | 9.254 | 9.410 | Continuing | Continuing |
| • OPN/1602: *LCS ASW Mission Modules* | 0.000 | 0.000 | 57.294 | - | 57.294 | 52.754 | 63.181 | 34.104 | 34.777 | 142.398 | 384.508 |
| • RDTEN/3086: *Frigate* | 83.080 | 143.450 | 134.772 | - | 134.772 | 75.353 | 77.639 | 70.469 | 72.022 | Continuing | Continuing |
| • OPN/1604: *LCS In-Service Modernization* | 0.000 | 74.426 | 70.526 | - | 70.526 | 122.072 | 224.143 | 363.812 | 459.770 | 0.000 | 1,314.749 |

**Remarks**

**D. Acquisition Strategy**

The LCS program takes an evolutionary approach to acquisition that emphasizes competition as a key to achieving affordability. Initially, two industry teams competed against each other with two distinctly different LCS designs. The decision produced two flights with a vessel from each design: Flight 0 (LCS 1 and LCS 2); and Flight 0+ (LCS 3 and out). The Flight 0+ baseline incorporates lessons learned from the design, construction, and testing of the Flight 0 ships. The Navy conducted a limited competition amongst the existing LCS industry teams or team participants for the award of a contract for the construction of a block buy of up to ten (10) LCS Flight 0+ Class ships, with an objective of competitively awarding a single contract to a single industry team.

By Acquisition Decision Memorandum of December 23, 2010, the USD (AT&L) authorized execution of an alternative acquisition strategy for the FY 2010 through FY 2015 procurement of 20 seaframes through two ten-ship block buy contracts. On December 29, 2010, the Navy awarded two contracts for block buys of up to ten ships, beginning with the award to each contractor of one FY 2010 ship and associated non-recurring engineering, the development of the Technical Data Package (TDP), core class services, and associated data. This was followed by the contractual funding of one ship to each contractor in FY 2011 and two ships each funded in FY 2012 through FY 2014.

On October 17, 2014 USD(AT&L) approved the Navy's plan to procure three ships in FY 2015 and three ships in FY 2016 by modifying the current block buy contracts. The modification to each of the block buy contracts completed the previously approved 20 ship block buy procurement and added options for two FY 2016 ships for a total of 26 LCS ships. Three additional LCS ships were awarded in FY17. The Navy's Acquisition Strategy supports procurement of LCS ships from FY18 through FY19 as currently budgeted.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603581N / *(U)LITTORAL COMBAT SHIP* | **Project (Number/Name)**<br>3096 / *Littoral Combat Ship* |

**E. Performance Metrics**

The LCS Program achieved Milestone A and Program Initiation in May 2004 and Milestone B in February 2011. The LCS program conducts annual Defense Acquisition Board In-Process Reviews (DAB IPRs). The first Seaframe and Mission Module integrated program DAB IPR was conducted in January 2013 and is held in September thereafter.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603581N / *(U)LITTORAL COMBAT SHIP* | **Project (Number/Name)**<br>3096 / *Littoral Combat Ship* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Product Development Summary | Various | Various : Various | 479.868 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 479.868 | - |
| | | **Subtotal** | 479.868 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 479.868 | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Government Engineering Support | WR | NSWC/DD : Dahlgren, VA | 68.080 | 2.170 | Sep 2017 | 2.023 | Feb 2018 | 1.460 | Nov 2018 | - | | 1.460 | 1.292 | 75.025 | - |
| Government Engineering Support | WR | NSWC/PC : Panama City, FL | 27.987 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 27.987 | - |
| Government Engineering Support | WR | NUWC/N : Newport, RI | 9.859 | 0.180 | Apr 2017 | 0.153 | Nov 2017 | 0.110 | Nov 2018 | - | | 0.110 | 0.000 | 10.302 | - |
| Government Engineering Support | WR | NAWC/AD : Pax River, MD | 25.062 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 25.062 | - |
| Government Engineering Support | WR | NSWC/CR : Crane, IN | 17.722 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 17.722 | - |
| Government Engineering Support | WR | NSWC/PD : Philadelphia, PA | 70.881 | 2.245 | Feb 2018 | 1.906 | Feb 2018 | 1.375 | Nov 2018 | - | | 1.375 | 0.941 | 77.348 | - |
| Government Engineering Support | Various | Government Activities : Various | 50.416 | 2.359 | Jul 2017 | 2.000 | Feb 2018 | 1.443 | Nov 2018 | - | | 1.443 | 1.136 | 57.354 | - |
| Contractor Engineering Support | C/CPAF | Alion/CSC : Arlington, VA | 49.802 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 49.802 | - |
| Contractor Engineering Support | C/CPAF | Various : Various | 20.617 | 2.198 | Sep 2017 | 1.863 | Feb 2018 | 1.344 | Mar 2019 | - | | 1.344 | 1.759 | 27.781 | - |
| Government Engineering Support | WR | NSWC/CD : Bethesda, MD | 4.643 | 5.470 | Apr 2017 | 4.592 | Feb 2018 | 2.131 | Nov 2018 | - | | 2.131 | 4.558 | 21.394 | - |
| Government Engineering Support | WR | PEO IWS : Various | 0.300 | 3.088 | Jan 2017 | 2.613 | Mar 2018 | 1.886 | Dec 2018 | - | | 1.886 | 2.310 | 10.197 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603581N / *(U)LITTORAL COMBAT SHIP* | Project (Number/Name)<br>3096 / *Littoral Combat Ship* | |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Contractor Engineering Support | WR | General Dynamics Bath Iron Works : Bath, ME | 0.933 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.933 | - |
| Condition Based Maintenance | WR | NSWC/PHD : Port Hueneme, CA | 5.180 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 5.180 | - |
| Government Engineering Support | WR | NSWC/PHD : Port Hueneme, CA | 0.788 | 0.070 | Apr 2017 | 0.059 | Nov 2017 | 0.043 | Nov 2018 | - | | 0.043 | 0.000 | 0.960 | - |
| Frigate Government Engineering Support | WR | NSWC/CD : Carderock, MD | 1.179 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.179 | - |
| Frigate Government Engineering Support | WR | NSWC/PD : Philadelphia, PA | 0.468 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.468 | - |
| Frigate Contractor Engineering Support | C/CPAF | Alion : Arlington, VA | 0.973 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.973 | - |
| Frigate Contractor Engineering Support | C/CPAF | Booz Allen Hamilton : McLean, VA | 0.345 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.345 | - |
| | | **Subtotal** | 355.235 | 17.780 | | 15.209 | | 9.792 | | - | | 9.792 | 11.996 | 410.012 | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Test & Evaluation | C/CPAF | Alion/CSC : Arlington, VA | 31.844 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 31.844 | - |
| Test & Evaluation | WR | NSWC/PHD : Port Hueneme, CA | 56.878 | 0.678 | Apr 2017 | 0.416 | Jan 2018 | 0.179 | Nov 2018 | - | | 0.179 | 0.751 | 58.902 | - |
| Test & Evaluation | WR | NSWC/PD : Philadelphia, PA | 65.428 | 0.916 | Apr 2017 | 0.825 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 67.169 | - |
| Test & Evaluation | WR | NSWC/PC : Panama City, FL | 16.414 | 0.059 | Apr 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 16.473 | - |
| Test & Evaluation | WR | COMOPTEVFOR : Norfolk, VA | 14.563 | 0.330 | Apr 2017 | 0.000 | | 0.757 | Nov 2018 | - | | 0.757 | 0.400 | 16.050 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603581N / *(U)LITTORAL COMBAT SHIP* | Project (Number/Name)<br>3096 / *Littoral Combat Ship* | |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Test & Evaluation | WR | NSWC/COR : Corona, CA | 17.746 | 0.440 | Apr 2017 | 0.245 | Nov 2017 | 0.106 | Nov 2018 | - | | 0.106 | 0.000 | 18.537 | - |
| Test & Evaluation | WR | Government Activities : Various | 70.872 | 0.194 | Apr 2017 | 0.500 | Nov 2017 | 0.216 | Mar 2019 | - | | 0.216 | 1.223 | 73.005 | - |
| Test & Evaluation | C/CPAF | LM/GD/Austal : Various | 78.326 | 1.850 | Nov 2016 | 0.890 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 81.066 | - |
| Test & Evaluation | WR | PEO C4I : Charleston, SC | 11.562 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 11.562 | - |
| T&E Ordnance/ Ammunition | WR | PEO IWS : Various | 21.902 | 0.642 | Apr 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 22.544 | - |
| FSST Support | WR | NAVAIR : Patuxent River, MD | 3.872 | 0.615 | Jan 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 4.487 | - |
| Range Support | WR | NAWC/WD : Pt. Mugu, CA | 2.693 | 0.775 | Feb 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.468 | - |
| Test & Evaluation | WR | NSWC/CD : Bethesda, MD | 16.142 | 3.716 | Jan 2017 | 2.756 | Feb 2018 | 1.170 | Mar 2019 | - | | 1.170 | 1.030 | 24.814 | - |
| FSST Support | C/BA | National Science Foundation : Arlington, VA | 2.321 | 0.350 | Apr 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.671 | - |
| FSST Support | C/BA | NAVFAC Atlantic : Virginia Beach, VA | 0.759 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.759 | - |
| Test & Evaluation | C/BA | Naval Research Laboratory : Washington, DC | 0.754 | 0.345 | Apr 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.099 | - |
| | | **Subtotal** | 412.076 | 10.910 | | 5.632 | | 2.428 | | - | | 2.428 | 3.404 | 434.450 | N/A |

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management Support- SEAPORT | C/CPAF | Alion/CSC : Arlington, VA | 20.593 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 20.593 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603581N / *(U)LITTORAL COMBAT SHIP* | **Project (Number/Name)**<br>3096 / *Littoral Combat Ship* |

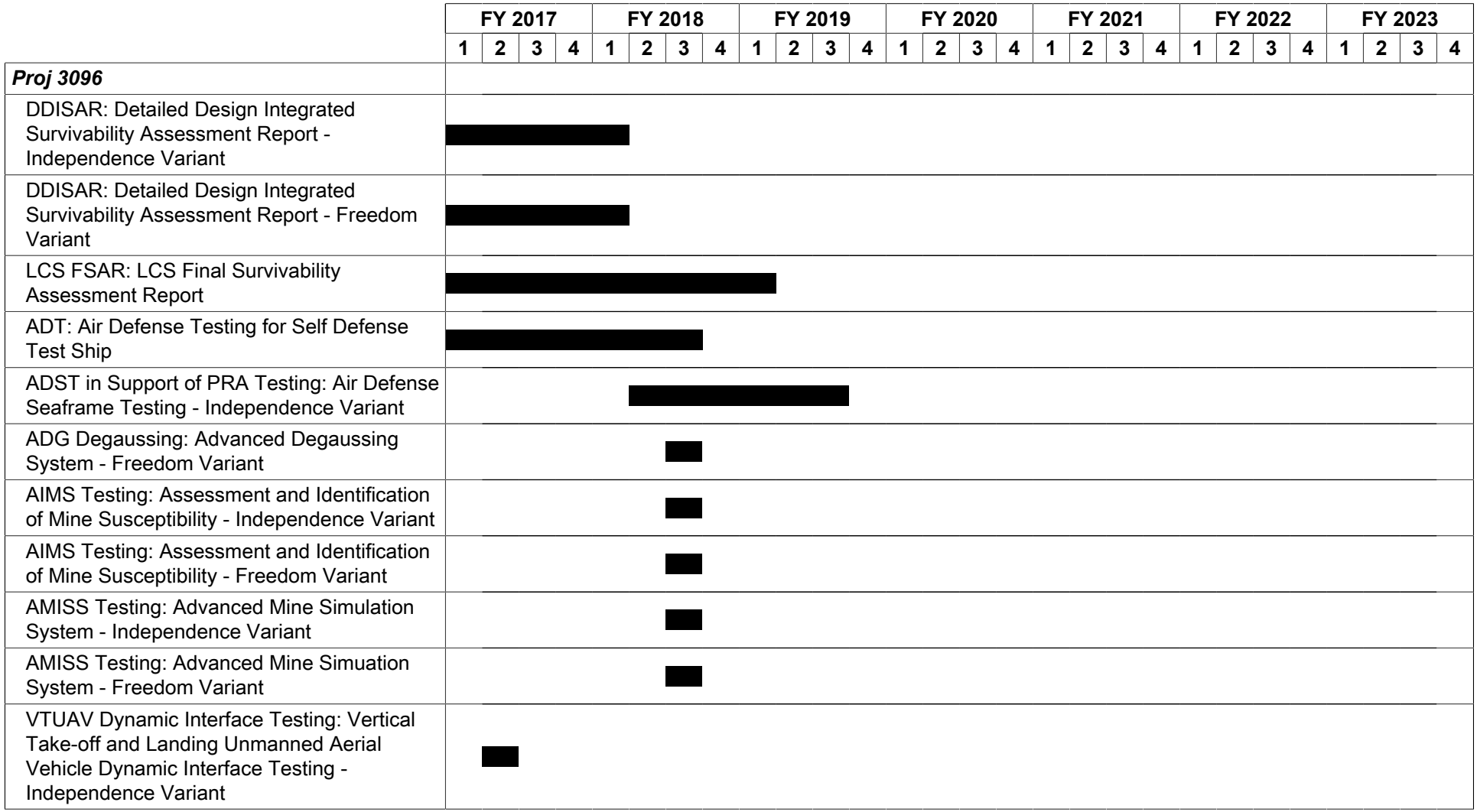
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management Support | Various | Various : Various | 12.212 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 12.212 | - |
| | | **Subtotal** | 32.805 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 32.805 | N/A |

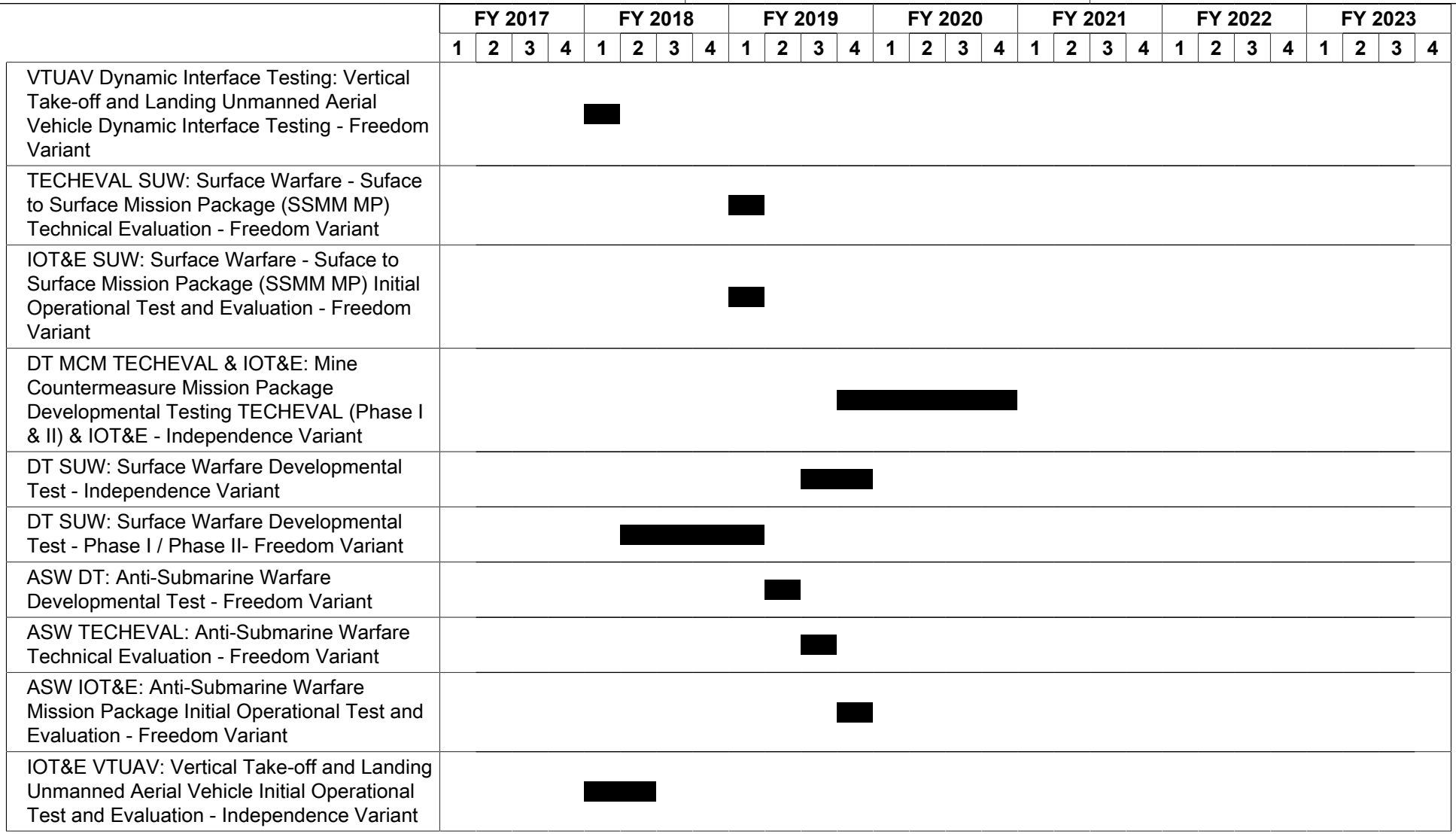
| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 1,279.984 | 28.690 | | 20.841 | | 12.220 | | - | | 12.220 | 15.400 | 1,357.135 | N/A |

**Remarks**

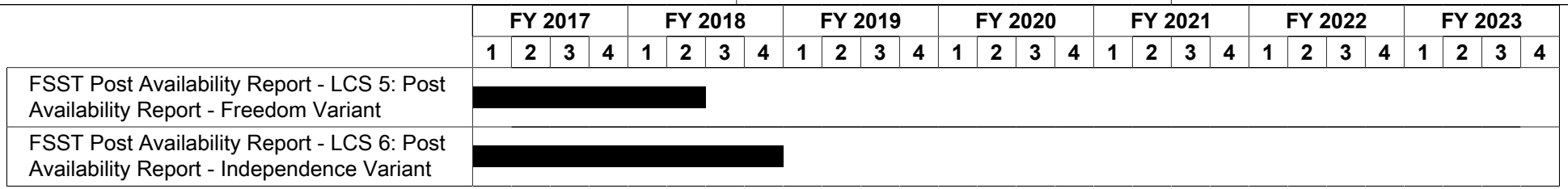
| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603581N / *(U)LITTORAL COMBAT SHIP* | **Project (Number/Name)**<br>3096 / *Littoral Combat Ship* |



| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603581N / *(U)LITTORAL COMBAT SHIP* | **Project (Number/Name)**<br>3096 / *Littoral Combat Ship* |



| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603581N / *(U)LITTORAL COMBAT SHIP* | **Project (Number/Name)**<br>3096 / *Littoral Combat Ship* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603581N / *(U)LITTORAL COMBAT SHIP* | **Project (Number/Name)**<br>3096 / *Littoral Combat Ship* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3096*** | | | | |
| DDISAR: Detailed Design Integrated Survivability Assessment Report - Independence Variant | 1 | 2017 | 1 | 2018 |
| DDISAR: Detailed Design Integrated Survivability Assessment Report - Freedom Variant | 1 | 2017 | 1 | 2018 |
| LCS FSAR: LCS Final Survivability Assessment Report | 1 | 2017 | 1 | 2019 |
| ADT: Air Defense Testing for Self Defense Test Ship | 1 | 2017 | 3 | 2018 |
| ADST in Support of PRA Testing: Air Defense Seaframe Testing - Independence Variant | 2 | 2018 | 3 | 2019 |
| ADG Degaussing: Advanced Degaussing System - Freedom Variant | 3 | 2018 | 3 | 2018 |
| AIMS Testing: Assessment and Identification of Mine Susceptibility - Independence Variant | 3 | 2018 | 3 | 2018 |
| AIMS Testing: Assessment and Identification of Mine Susceptibility - Freedom Variant | 3 | 2018 | 3 | 2018 |
| AMISS Testing: Advanced Mine Simulation System - Independence Variant | 3 | 2018 | 3 | 2018 |
| AMISS Testing: Advanced Mine Simuation System - Freedom Variant | 3 | 2018 | 3 | 2018 |
| VTUAV Dynamic Interface Testing: Vertical Take-off and Landing Unmanned Aerial Vehicle Dynamic Interface Testing - Independence Variant | 2 | 2017 | 2 | 2017 |
| VTUAV Dynamic Interface Testing: Vertical Take-off and Landing Unmanned Aerial Vehicle Dynamic Interface Testing - Freedom Variant | 1 | 2018 | 1 | 2018 |
| TECHEVAL SUW: Surface Warfare - Suface to Surface Mission Package (SSMM MP) Technical Evaluation - Freedom Variant | 1 | 2019 | 1 | 2019 |
| IOT&E SUW: Surface Warfare - Suface to Surface Mission Package (SSMM MP) Initial Operational Test and Evaluation - Freedom Variant | 1 | 2019 | 1 | 2019 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603581N / *(U)LITTORAL COMBAT SHIP* | **Project (Number/Name)**<br>3096 / *Littoral Combat Ship* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| DT MCM TECHEVAL & IOT&E: Mine Countermeasure Mission Package Developmental Testing TECHEVAL (Phase I & II) & IOT&E - Independence Variant | 4 | 2019 | 4 | 2020 |
| DT SUW: Surface Warfare Developmental Test - Independence Variant | 3 | 2019 | 4 | 2019 |
| DT SUW: Surface Warfare Developmental Test - Phase I / Phase II- Freedom Variant | 2 | 2018 | 1 | 2019 |
| ASW DT: Anti-Submarine Warfare Developmental Test - Freedom Variant | 2 | 2019 | 2 | 2019 |
| ASW TECHEVAL: Anti-Submarine Warfare Technical Evaluation - Freedom Variant | 3 | 2019 | 3 | 2019 |
| ASW IOT&E: Anti-Submarine Warfare Mission Package Initial Operational Test and Evaluation - Freedom Variant | 4 | 2019 | 4 | 2019 |
| IOT&E VTUAV: Vertical Take-off and Landing Unmanned Aerial Vehicle Initial Operational Test and Evaluation - Independence Variant | 1 | 2018 | 2 | 2018 |
| FSST Post Availability Report - LCS 5: Post Availability Report - Freedom Variant | 1 | 2017 | 2 | 2018 |
| FSST Post Availability Report - LCS 6: Post Availability Report - Independence Variant | 1 | 2017 | 4 | 2018 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603581N / *(U)LITTORAL COMBAT SHIP* | Project (Number/Name)<br>4506 / *LCS Training* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4506: *LCS Training* | 8.085 | 22.116 | 20.150 | 15.777 | - | 15.777 | 2.153 | 1.748 | 0.893 | 0.915 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Project MDAP/MAIS Code:** 374

**A. Mission Description and Budget Item Justification**

LCS is a minimally-manned ship, and the small crew. LCS uses a Train-to-Qualify (T2Q)/Train-to-Certify (T2C) training process in an off-ship/shore-based virtual ship trainer environment, using simulators and blended training solutions focused on tactical, equipment operations, and maintenance training. When completely developed and procured, the LCS shore-based training capability will satisfy individual, team, unit, and force training, with an objective of meeting Capability Development Document (CDD) T2Q/T2C Key Performance Parameter (KPP) requirements.

RDT&E funds are used to develop advanced Immersive Virtual Ship Environment (IVSE), or Virtual Reality (VR) courseware and associated simulators to achieve the training objectives. Additionally, after fielding these systems and courseware, RDT&E funds will be utilized to upgrade training to maintain conformity with LCS configurations and approved operational technical manuals and procedures. RDT&E funds are also used to test and evaluate training devices to verify compliance with requirements.

The FY 2019 funding request was reduced by $2.208 million to account for the availability of prior year execution balances.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** LCS Total System Training Architecture | 22.116 | 20.150 | 15.777 | 0.000 | 15.777 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY18 funding provides for the development and testing of various training courseware to provide the fleet with these required training capabilities as LCS hull deliveries increase. RDT&E funding provides Naval Air Warfare Center Training Systems Division (NAWC TSD) program management oversight as the LCS Training System Executive Agent. Funding is provided to continue Phase I and II of the IVSE combat systems courseware development, begin IVSE Deck Courseware development and oversee performance of the development efforts, while providing additional support efforts to the LCS Fleet Introduction Program Office (PMS 505). This funding also supports continued NAVFAC efforts preparing for additional small ship homeports required by the Strategic Laydown plan. | | | | | |
| ***FY 2019 Base Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603581N / *(U)LITTORAL COMBAT SHIP* | **Project (Number/Name)**<br>4506 / *LCS Training* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| FY19 funding provides for the development and testing of multiple training courseware to provide the fleet with these required training capabilities and LCS hull deliveries increase. RDT&E funding provides Naval Air Warfare Center Training Systems Division (NAWC TSD) program management oversight while they complete the development of LCS deck operations (both variants) and continue combat systems IVSE courseware and begins the development of the combat systems part task trainer. NAWC will start the development of the VTUAV visual display trainer, oversee performance of the development effort, while providing additional support efforts to the LCS Fleet Introduction Program Office (PMS 505). This funding also supports continued NAVFAC efforts preparing for additional small ship homeports required by the Strategic Laydown plan.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>The decrease of $4.373M from FY18 to FY19 is due to a $0.303M rate/efficiency reduction, $2.208M prior year under execution reduction and the completion of $1.862M of Training Development and Courseware efforts, as both Phases will be completed within FY18. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 22.116 | 20.150 | 15.777 | 0.000 | 15.777 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • OPN/5664: *Surface Training Equipment* | 87.714 | 83.022 | 230.425 | - | 230.425 | 120.574 | 102.596 | 70.083 | 69.408 | Continuing | Continuing |

**Remarks**

PEOLCS funding accounts for only a portion of the OPN/5664 Line.

**D. Acquisition Strategy**

Per the combined LCS Navy Training System Plan (NTSP), the LCS core crew training concept will meet Train to Qualify and Train to Certify requirements incrementally, with expected completion in FY20. In the interim, individual qualifications for LCS crew members will be accomplished through a combination of vendor training, existing Navy training, new LCS courses and trainers that are presently online, and Under Instruction (U/I) time aboard LCS ships, prior to reporting for duty. Shore-based training requirements cannot be fully met with the interim LCS training strategy. Full realization will be achieved with the completed standup of the San Diego LCS Training Facility (LTF), which includes the Integrated Tactical Trainers, Bridge, Readiness Control Officer (RCO), Combat Systems and Mission Package

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603581N / *(U)LITTORAL COMBAT SHIP* | **Project (Number/Name)**<br>4506 / *LCS Training* |

Training System (MPTS) part-task trainers, the Common Mission Package Trainer (CMPT), Mission Bay trainer and Virtual Reality Labs to support the Train to Qualify operations and maintenance pipeline courses.

**E. Performance Metrics**

T2Q will succeed and support mission accomplishment in the long run only if commanders have confidence that the output is valid, reliable, and standardized. To justify that confidence, training outcomes must mirror, and therefore predict, critical mission outcomes. To achieve that result a set of objective, performance-based measures, metrics, and standards is being developed for each watch station and billet requirement. For qualifications to be truly predictive, they must be guaranteed by the application of objective measures that vary little between evaluators. New courses such as the Surface Warfare Officers School (SWOS) LCS Officer of the Deck (OOD), Junior Officer of the Deck (JOOD) and the LCS Shore-Based Trainer Capstone courses have been designed to meet T2Q standards. Ultimately, success of the training acquisition strategy will be objectively validated by accomplishment of PQS by the sailors as determined by the IVSE and achievement of all requirements in the LCS Training Manual (TRAMAN) as assessed by LCS Squadrons and appropriate Afloat Training Groups (ATG).

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603581N / *(U)LITTORAL COMBAT SHIP* | **Project (Number/Name)**<br>4506 / *LCS Training* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Deck/Mission Bay Courseware | C/FFP | Cubic : Orlando, FL | 1.878 | 0.000 | | 0.000 | | 2.550 | Nov 2018 | - | | 2.550 | 0.000 | 4.428 | - |
| Combat Systems Courseware | C/FFP | Cubic : Orlando, FL | 0.000 | 14.200 | Feb 2017 | 10.145 | Nov 2017 | 7.316 | Nov 2018 | - | | 7.316 | 7.800 | 39.461 | - |
| Eng. Training Coursware | C/FFP | Cubic : Orlando, FL | 0.600 | 0.492 | Oct 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.092 | - |
| Training Development - Support | WR | NAWC/TSD : Orlando, FL | 4.547 | 3.203 | Nov 2016 | 4.000 | Nov 2017 | 0.587 | Nov 2018 | - | | 0.587 | Continuing | Continuing | Continuing |
| VTUAV/MH60 | C/FFP | TBD : TBD | 0.000 | 0.000 | | 0.000 | | 1.000 | Mar 2019 | - | | 1.000 | 6.270 | 7.270 | - |
| Combat System Part Task Trainer | C/FP | TBD : TBD | 0.000 | 0.000 | | 0.000 | | 1.500 | Mar 2019 | - | | 1.500 | 0.000 | 1.500 | - |
| Mission Bay Trainer | C/CPAF | Cubic : Orlando, FL | 0.000 | 0.822 | Oct 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.822 | - |
| | | **Subtotal** | 7.025 | 18.717 | | 14.145 | | 12.953 | | - | | 12.953 | Continuing | Continuing | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Human Systems Integration | WR | NSWC, DD : Dahlgren Virginia | 0.320 | 0.204 | Nov 2016 | 0.180 | Nov 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Information Assurance | WR | NSWC, DN : Dam Neck, VA | 0.400 | 1.214 | Nov 2016 | 1.500 | Nov 2017 | 1.500 | Nov 2018 | - | | 1.500 | Continuing | Continuing | Continuing |
| Training ISEA | WR | NSWC/PHD : Port Huenume, CA | 0.200 | 0.541 | Nov 2016 | 0.500 | Nov 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Warfare Center SME/ NAVFAC | WR | VARIOUS : VARIOUS | 0.000 | 0.067 | Mar 2017 | 0.170 | Nov 2017 | 0.150 | Nov 2018 | - | | 0.150 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.920 | 2.026 | | 2.350 | | 1.650 | | - | | 1.650 | Continuing | Continuing | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603581N / *(U)LITTORAL COMBAT SHIP* | Project (Number/Name)<br>4506 / *LCS Training* | |

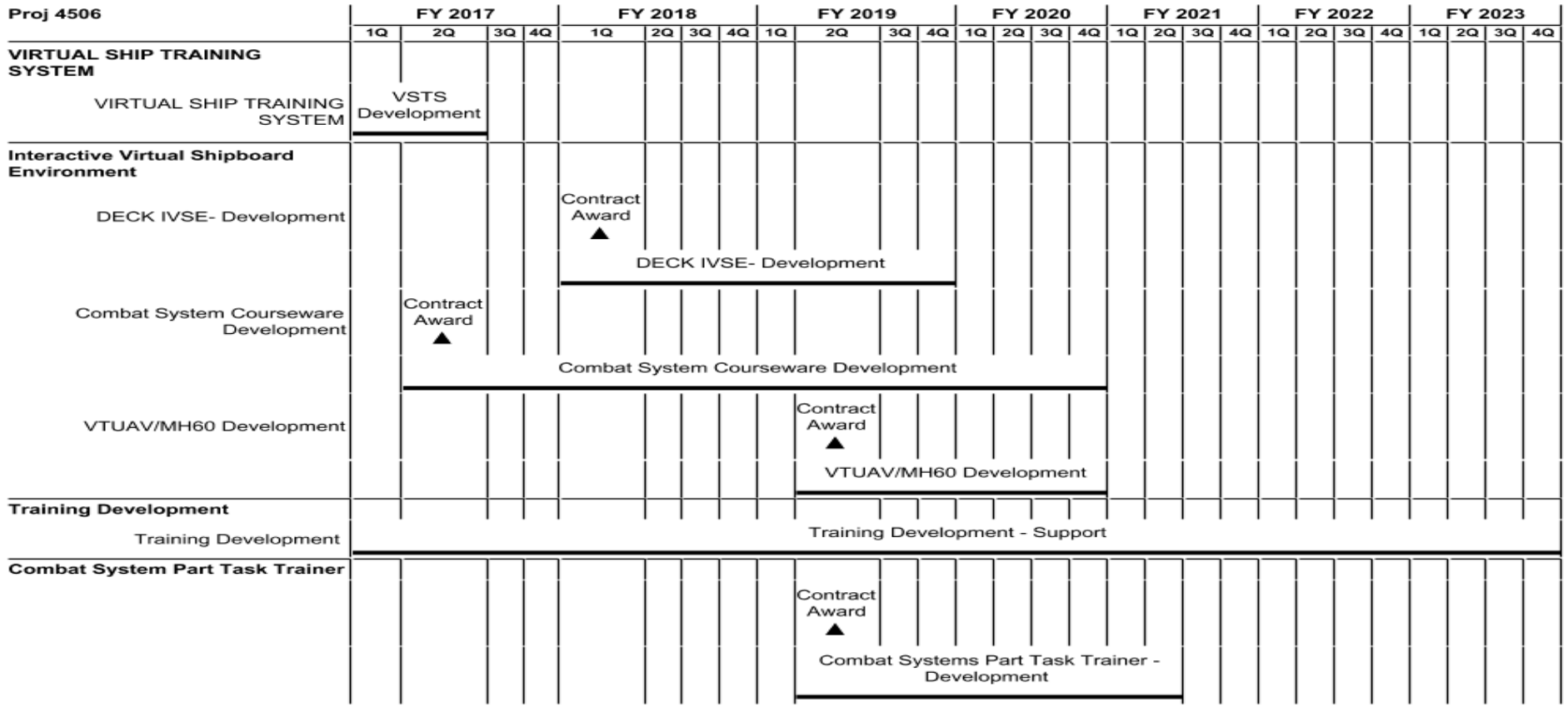
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Management Support | C/CPAF | Various : Various | 0.140 | 1.373 | Mar 2017 | 3.655 | Mar 2018 | 1.174 | Mar 2019 | - | | 1.174 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.140 | 1.373 | | 3.655 | | 1.174 | | - | | 1.174 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 8.085 | 22.116 | | 20.150 | | 15.777 | | - | | 15.777 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603581N / *(U)LITTORAL COMBAT SHIP* | **Project (Number/Name)**<br>4506 / *LCS Training* |




*2019PB - 0603581N - 4506*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603581N / *(U)LITTORAL COMBAT SHIP* | **Project (Number/Name)**<br>4506 / *LCS Training* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 4506*** | | | | |
| VIRTUAL SHIP TRAINING SYSTEM: VIRTUAL SHIP TRAINING SYSTEM: VSTS Development | 1 | 2017 | 2 | 2017 |
| Interactive Virtual Shipboard Environment: DECK IVSE- Development: DECK IVSE Contract Award | 1 | 2018 | 1 | 2018 |
| Interactive Virtual Shipboard Environment: DECK IVSE- Development: DECK IVSE-Development | 1 | 2018 | 4 | 2019 |
| Interactive Virtual Shipboard Environment: Combat System Courseware Development: Combat System Courseware Contract Award | 2 | 2017 | 2 | 2017 |
| Interactive Virtual Shipboard Environment: Combat System Courseware Development: Combat System Courseware Development | 2 | 2017 | 4 | 2020 |
| Interactive Virtual Shipboard Environment: VTUAV/MH60 Development: VTUAV/MH60 Contract Award | 2 | 2019 | 2 | 2019 |
| Interactive Virtual Shipboard Environment: VTUAV/MH60 Development: VTUAV/MH60 Development | 2 | 2019 | 4 | 2020 |
| Training Development: Training Development: Training Development - Support | 1 | 2017 | 4 | 2023 |
| Combat System Part Task Trainer: Combat Systems Part Task Trainer - Contract Award | 2 | 2019 | 2 | 2019 |
| Combat System Part Task Trainer: Combat Systems Part Task Trainer - Development | 2 | 2019 | 2 | 2021 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603582N *I Combat System Integration* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 384.945 | 23.839 | 24.674 | 16.351 | - | 16.351 | 27.921 | 16.015 | 15.509 | 26.496 | Continuing | Continuing |
| 0164: *Combat System Integration* | 384.945 | 23.839 | 20.274 | 16.351 | - | 16.351 | 27.921 | 16.015 | 15.509 | 26.496 | Continuing | Continuing |
| 3425: *Digital Warfare* | 0.000 | 0.000 | 4.400 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 4.400 |

**A. Mission Description and Budget Item Justification**

Beginning in PB 19, Proj 3425 Digital Warfare (DW)MBE&DT Development moved to new RDT&EN PE 0603017N.

Chief of Naval Operations (CNO) created the Navy's Strike Force Interoperability (SFI) Program in 1998 in response to critical shortfalls in the introduction of integrated and interoperable System of Systems (SoS) to deploying Strike Forces. Naval Sea Systems Command (NAVSEA) acts as management lead for Joint System Command (SYSCOM) system certification policy and guidance and certifies platforms for interoperability within the platform and throughout the enterprise, in accordance with Commander, US Fleet Forces Command/Commander, Pacific Fleet COMUSFLTFORCOM/COMPACFLT) Inst. 4720.3B (OCT 2008), C5ISR Modernization Policy. COMUSFLTFORCOM/COMPACFLT Inst. 4720.3B also requires that NAVSEA act as administrative agent for NAVIFOR Command and Control, Communications, Computers, Combat Systems, and Intelligence Modernization Process (C5IMP) and execution agent for Navy Command and Control, Communications, Computers, and Combat Systems Integration (C5I) Modernization Conferences (NCMC). This program conducts Interoperability Assessments that are required to certify Aircraft Carriers, Amphibious Assault Ships, and Surface Combatants in accordance with the Naval Warfare System Certification Policy (NWSCP), NAVSEAINST 9410.2A, NAVAIR 5230.20, SPAWAR 5234.1.

The SFI Program ensures overall strike force interoperability is characterized and assessed. NAVSEA is assigned central United States Navy (USN) responsibility for interoperability, directing the development of policy and architecture for Strike Force warfare systems engineering and implementation of common warfare systems engineering processes and preliminary work to support the Digital Warfare (DW) mission area model based system engineering.

There are three priorities within the Strike Force Interoperability Program:

(1) Support Fleet "as-is" state which includes Navigation System Certification (NAVCERT), Interoperability Capabilities & Limitations, and Interoperability Tactical Information Coordinator Technical Aids (TIC TECHAIDs).

(2) Support Ship's system modernization (non-HME) including warfighting capability & other C5I upgrades including C5IMP Baseline Management.

(3) Support Ship Warfare System Certification & Force Level Assessments. This includes Warfare Systems Certification, Interoperability Certification, Force Level Interoperability Analysis, & Assessments, Cybersecurity Assessments and recommendations for improvements to the program offices for implementation at the systems level.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy* / BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603582N / *Combat System Integration* |

Project 0164 Combat System Integration: This project consists of five key Pillars executed within the Strike Force Interoperability (SFI) Program:

(1) Command & Control, Communications, Computer, Combat Systems, Intelligence, Surveillance and Reconnaissance (C5ISR) Modernization Process (C5IMP). The C5IMP validates the introduction of new systems into the fleet and ensures systems' maturity prior to shipboard installation thereby reducing risk and enhancing readiness and effectiveness of deploying ships and strike groups.

(2) Warfare Systems Certification (WSCERT), which is essential to validating the maturity and operational performance of warfare systems prior to Fleet delivery and deployment.

(3) The integrated Navigation System Certification (NAVCERT) program certifies the shipboard integrated navigation suite for safe navigation using the Electronic Charting and Display Information System Navy (ECDIS-N) as the primary plot. To support Strike Force Interoperability and ship's mission requirements, it ensures that the installed integration navigation suite provides accurate and timely navigation information (position, velocity, speed, heading, roll, and pitch) to all navigation data consumers. This supports the following mission critical functions: pre-launch aircraft alignment, safe aircraft precision approach and landing operations, and accurate warfare/weapon systems targeting.

(4) Interoperability Certification and Assessment (IOP C&A), the independent assessment of strike group warfare systems operational performance. Interoperability assessment examines force level engagement threads, aircraft control, air battle management, and operational displays. Assessments of deploying ships in strike force configurations are accomplished through the use of the Navy's Distributed Integration and Interoperability Assessment Capability (DIIAC) which supports the Deputy Assistant Secretary of the Navy (DASN) "shift to the left" policy by providing early interoperability testing in the acquisition lifecycle. It is a Commander, U.S. Fleet Forces Command (CFFC) and Commander U.S. Pacific Fleet (COMPACFLT) requirement that all strike forces undergo interoperability assessment testing in the DIIAC prior to deployment. Interoperability certification results are used to develop fleet tactical tools (Capabilities & Limitations (C&L) documentation and Tactical Information Coordinator Technical Aids (TIC TECHAIDS)), that ensure that systems' operators understand the interoperability capabilities and limitations of their combat systems and have the watch station tools necessary for the execution of their tactical responsibilities.

(5) Cybersecurity Certification and Assessment (CYBER C&A), the assessment of systems' cybersecurity, as directed by OPNAV memorandum 5400 Ser N2N6/4U1119089, including compliance with DODi 8500.01 for each warfare system element, identifies vulnerabilities at both the element, system and enclave levels, and assesses a ship's IT/IA Cybersecurity posture in support of Warfare Systems Certification IAW the NAVSEAINST 9410.2 (series). Assessments of deploying ships in strike force configurations for its Cybersafe Readiness are accomplished through the use of the Navy's USS Secure environment leveraging existing navy labs and DOD Cyber Ranges and Fleet exercises using the cyber table top technique, red team, blue team, and cyber specific metrics/measure analysis to evaluate the system's and enclaves' ability to protect, detect, react and response to achieve its warfare mission requirement. System commands and programs of record also use these cyber assessments to guide their development of specific procedures for immediate response to cyber threats while maintaining maximum operational effectiveness. The cyber assessment results and ship systems and enclaves response procedures are also used to develop Fleet Cyber Tactical Tools (Capabilities & Limitations (CC&L) documentation and Cyber Tactical Technical Aids (CYBER TECHAIDS)), to ensure that systems' operators understand the capabilities and limitations of their combat systems and have the watch station tools necessary for the execution of their tactical responsibilities under various cyber threat conditions.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603582N *I Combat System Integration* |

Project 3312 Maritime Theater Missile Defense Forum (MTMD):
This project funds participation in Maritime Integrated Air and Missile Defense projects with other nations. Included is participation in the Maritime Missile Defense Projects Framework Memorandum of Understanding of 2004 (as amended 2009). Known as the Maritime Theater Missile Defense (MTMD) forum, it promotes interoperability with the Navies of ten participating nations (Australia, Canada, France, Germany, Italy, Netherlands, Norway, Spain, United Kingdom and the United States). This project funds participation in several Project Arrangements and includes maritime contribution to the NATO Active Layered Theater Ballistic Missile Defense (ALTBMD) project, now known as NATO Ballistic Missile Defense (BMD). Engineering analysis and recommendations from MTMD activities are provided to European, Pacific and Central Combatant Commands to influence present day operations. Specifically, the MTMD Forum is addressing challenges with "Maritime Allied Air Defense in Support of Ballistic Missile Defense Operations" that face the Combatant Commanders during present day operations.

The MTMD forum provides protection against the proliferation of short, medium and long-range Ballistic Missile (BM) and Advanced Anti-Ship Cruise Missile (ASCM) threats through the creation of an interoperable sea-based Integrated Air and Missile Defense (IAMD) capability among coalition nations. This includes protection across the full spectrum of these threats through the enhanced utilization of existing sea-based systems to protect against current threats while progressively improving and developing systems and system-of- systems to effectively counter evolving threats.
This project supports USN participation in several Maritime IAMD related Project Arrangements and Working Groups including:
(1) Battle Management Command, Control, Communications, Computers, and Intelligence (BMC4I) to define and develop architectures as well as to perform engineering to addresscoalition capability gaps.
(2) Modeling & Simulation (M&S) to establish and maintain a maritime coalition M&S testbed and to perform legacy and future systems simulation testing.
(3) Coalition Distributed Engineering Plant (CDEP) to establish and maintain a maritime coalition Hardware-in-the-Loop Testbed and to conduct CDEP testing.
(4) Open Architecture (OA) to develop Interface Standards and Data Models.
(5) Test Planning and Execution (TPEX) to develop Test Plans, oversee exercise participation and conduct post event data analysis and reporting.
(6) Operational Requirements (OR) to develop a Coalition Maritime Missile Defense Operational Concept Document and to identify operational constraints and tactical constructssurrounding coalition maritime missile defense activities.
(7) Reciprocal Use of Test Facilities agreements with other nations to support Maritime IAMD and MTMD related demonstrations.

Starting in FY17 and through the out-years, the MTMD project moves to Program Element 0605853N under Project Unit 3312: MTMD-Maritime Theater Missile Defense Forum.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | Date: February 2018 |
|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | R-1 Program Element (Number/Name)<br>PE 0603582N *I Combat System Integration* | | |
| **B. Program Change Summary ($ in Millions)** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** |
| Previous President's Budget | 26.530 | 24.674 | 26.110 | - | 26.110 |
| Current President's Budget | 23.839 | 24.674 | 16.351 | - | 16.351 |
| Total Adjustments | -2.691 | 0.000 | -9.759 | - | -9.759 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | 0.750 | 0.000 | | | |
| • SBIR/STTR Transfer | -0.421 | 0.000 | | | |
| • Program Adjustments | -3.000 | 0.000 | -9.471 | - | -9.471 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -0.288 | - | -0.288 |
| • Congressional General Reductions Adjustments | -0.020 | - | - | - | - |

**Change Summary Explanation**

Beginning in PB 19, Proj 3425 Digital Warfare (DW) moved to new RDT&EN PE 0603017N.

The FY 2019 funding request in Proj 0164 was reduced by $2.0 million to account for the availability of prior year execution balances.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | | | | | R-1 Program Element (Number/Name)<br>PE 0603582N / *Combat System Integration* | | | | Project (Number/Name)<br>0164 / *Combat System Integration* | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| 0164: *Combat System Integration* | 384.945 | 23.839 | 20.274 | 16.351 | - | 16.351 | 27.921 | 16.015 | 15.509 | 26.496 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Project 0164: Combat System Integration:

This project consists of five key Pillars executed within the Strike Force Interoperability (SFI) Program:

(1) Command & Control, Communications, Computer, Combat Systems, Intelligence, Surveillance and Reconnaissance (C5ISR) Modernization Process (C5IMP). The C5IMP validates the introduction of new systems into the fleet and ensures systems' maturity prior to shipboard installation thereby reducing risk and enhancing readiness and effectiveness of deploying ships and strike groups.

(2) Warfare Systems Certification (WSCERT), which is essential to validating the maturity and operational performance of warfare systems prior to Fleet delivery and deployment.

(3) The integrated Navigation System Certification (NAVCERT) program certifies the shipboard integrated navigation suite for safe navigation using the Electronic Charting and Display Information System Navy (ECDIS-N) as the primary plot. To support Strike Force Interoperability and ship's mission requirements, it ensures that the installed integration navigation suite provides accurate and timely navigation information (position, velocity, speed, heading, roll, and pitch) to all navigation data consumers. This supports the following mission critical functions: pre-launch aircraft alignment, safe aircraft precision approach and landing operations, and accurate warfare/weapon systems targeting.

(4) Interoperability Certification and Assessment (IOP C&A), the independent assessment of strike group warfare systems operational performance. Interoperability assessment examines force level engagement threads, aircraft control, air battle management, and operational displays. Assessments of deploying ships in strike force configurations are accomplished through the use of the Navy's Distributed Integration and Interoperability Assessment Capability (DIIAC) which supports the Deputy Assistant Secretary of the Navy (DASN) "shift to the left" policy by providing early interoperability testing in the acquisition lifecycle. It is a Commander, U.S. Fleet Forces Command (CFFC) and Commander U.S. Pacific Fleet (COMPACFLT) requirement that all strike forces undergo interoperability assessment testing in the DIIAC prior to deployment. Interoperability certification results are used to develop fleet tactical tools (Capabilities & Limitations (C&L) documentation and Tactical Information Coordinator Technical Aids (TIC TECHAIDS)), that ensure that systems' operators understand the interoperability capabilities and limitations of their combat systems and have the watch station tools necessary for the execution of their tactical responsibilities.

(5) Cybersecurity Certification and Assessment (CYBER C&A), the assessment of systems' cybersecurity, as directed by OPNAV memorandum 5400 Ser N2N6/4U1119089, including compliance with DODi 8500.01 for each warfare system element, identifies vulnerabilities at both the element, system and enclave levels, and assesses a ship's IT/IA Cybersecurity posture in support of Warfare Systems Certification IAW the NAVSEAINST 9410.2 (series). Assessments of deploying

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603582N / *Combat System Integration* | **Project (Number/Name)**<br>0164 / *Combat System Integration* |

ships in strike force configurations for its Cybersafe Readiness are accomplished through the use of the Navy's USS Secure environment leveraging existing navy labs and DOD Cyber Ranges and Fleet exercises using the cyber table top technique, red team, blue team, and cyber specific metrics/measure analysis to evaluate the system's and enclaves' ability to detect, react and response to achieve its warfare mission requirement. System commands and programs of record also use these cyber assessments to guide their development of specific procedures for immediate response to cyber threats while maintaining maximum operational effectiveness. The cyber assessment results and ship systems and enclaves response procedures are also used to develop Fleet Cyber Tactical Tools (Capabilities & Limitations (CC&L) documentation and Cyber Tactical Technical Aids (CYBER TECHAIDS)), to ensure that systems' operators understand the capabilities and limitations of their combat systems and have the watch station tools necessary for the execution of their tactical responsibilities under various cyber threat conditions.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Navigation System Certification (NAVCERT) | 1.583 | 1.567 | 1.335 | 0.000 | 1.335 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** The Navigation Certification (NAVCERT) program provides assurance to the ship, Immediate Superior in Command (ISIC) and Type Commander that the ship's integrated navigation suite operates as intended and meets performance requirements for safe navigation. The certification verifies the accuracy of the data originating from an array of sensors and validates its receipt by all users including Aircraft Inertial Alignment System and Integrated Warfare Systems. Certification is required at five-year intervals, following Chief of Naval Operations Availabilities greater than six months, or in support of Precision Approach and Landing System (PALS) operations. The scope of the certification includes all inertial navigation system equipment as well as the Electronic Chart Display and Information System - Navy (ECDIS- N). Forecasting the schedule for NAVCERT is based on the projection of schedule drivers (operational commitments, maintenance schedules) at the particular point in time. The scheduling realities associated with this process are such that in the face of frequent availability deferrals, cancellations, or delays, the supporting NAVCERT schedules adjust accordingly and those adjustments result in regular modifications to the numbers of certifications projected, period to period. | | | | | |
| ***FY 2018 Plans:***<br>(1) Conduct 36 NAVCERTs on U.S. Navy Surface Combatants, Aircraft Carriers, and Amphibious Ships. Achieve cost efficiencies by leveraging test results from conjunctive alterations to navigation systems during modernization periods. This includes 10 certifications scheduled for FY17 either deferred to or completing in FY18. | | | | | |
| ***FY 2019 Base Plans:***<br>(1) Conduct 18 scheduled NAVCERTs on Cruisers, Destroyers, Aircraft Carriers, and Amphibious Ships. Continue to achieve cost efficiencies by leveraging test results from conjunctive alterations to navigation systems during modernization | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603582N / *Combat System Integration* | **Project (Number/Name)**<br>0164 / *Combat System Integration* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| periods.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Reduction due to DON19 RDTEN Underexecution Review and Inflation Rate Change. | | | | | |
| ***Title:*** Command , Control, Communications, Computers, Combat Systems, Intelligence, Surveillance and Reconnaissance (C5ISR) Modernization Process (C5IMP)<br>***Articles:*** | 2.003<br>- | 2.506<br>- | 2.093<br>- | 0.000<br>- | 2.093<br>- |
| ***Description:*** This project is required to support the Fleet C5I Modernization Policy (per COMUSFLTFORCOM/ COMPACFLT Inst. 4720.3) to manage operational risks associated with C5ISR modernization in both afloat and ashore units in support of the Optimized Fleet Response Plan (OFRP), ensuring deploying units receive improved, interoperable, and certified warfighting capabilities in order to meet theater operational requirements. This project funds engineering assessments of proposed C5I capability modernizations to determine maturity for installation and risk associated with installs of equipment outside of normal modernization windows. The deliverables of this project are created by determining the maturity, through engineering analysis, of the critical linchpins needed to achieve interoperability for each proposed C5IMP capability improvement item to be installed in a ship's baseline, developing installation recommendations of C5I system upgrades for the Fleet Commanders, and researching and analyzing installation or operating problems. Failure to achieve required maturity for one system that is part of a warfare system package can prevent this system from being installed, thus breaking the capability planned for the entire original warfare package, which will impact Strike Group warfighting capabilities. There is close coordination with the FLTCDRs and TYCOMs as well as other members of the C5IMP community to address, coordinate, and resolve C5IMP modernization issues thereby reducing risk and enhancing readiness and effectiveness of deploying ships and strike groups. Focus is on key milestones ) such as Baseline Locking Events (BLEs) and a Planned Not Authorized (PNA) reviews, and SG/ARG Analysis Reports which are Fleet required events. The BLEs, PNA Reviews, and SG/ARG Analysis Reports are the primary work products in the C5IMP process. Forecasting C5ISR requirements and schedules is based on the projection of ships' operating/maintenance schedules at the particular point in time. Due to changing operational needs, these schedules frequently change causing availability extensions, deferrals, cancellations, or delays. Also, the length of availabilities vary and often extend past fiscal years. The supporting C5IMP/C5ISR schedules must adjust accordingly, resulting in regular modifications to the numbers of events/requirements projected for C5IMP/C5ISR from period to period. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603582N / *Combat System Integration* | **Project (Number/Name)**<br>0164 / *Combat System Integration* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***FY 2018 Plans:***<br>(1) Facilitate reviews, assessments, and execution of C5I installations during approximately seventy-two (72) CNO Availabilities.<br>(2) Support two (2) NCMCs<br>(3) Support twelve (12) Monthly Baseline Events where sixty-three (63) Ship's Baselines will be reviewed and locked and twelve (12) PNA monthly PNA Review Meetings where the fifty-seven (57) PNAs will be completed.<br>(4) Provide two (2) SG/ARG Analysis Reports.<br>(Note: Due to existing funding shortfalls, no O-FRP products are currently planned to be produced.)<br>***FY 2019 Base Plans:***<br>(1) Facilitate reviews, assessments, and execution of C5I installations during approximately seventy-four (74) CNO Availabilities.<br>(2) Support two (2) NCMCs<br>(3) Support twelve (12) Monthly Baseline Locking Events where sixty-five (65) Ships' Baselines will be reviewed and locked and twelve (12) monthly PNA Review Meetings where the PNA status of forty-nine (49) Ships will be reviewed.<br>(4)Provide two (2) SG/ARG Analysis Reports<br>(Note: Due to existing funding shortfalls, no O-FRP products are currently planned to be produced.)<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Reduction due to DON19 RDTEN Underexecution Review and Inflation Rate Change. | | | | | |
| ***Title:*** Interoperability Certification and Assessment | 13.355 | 12.274 | 10.469 | 0.000 | 10.469 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** This project funds interoperability assessments via the Distributed Integration & Interoperability Assessment Capability (DIIAC), the technical assessment of interoperable systems to meet mission requirements, the updating of Strike Group Capabilities and Limitations (C&L) and the updating of the Tactical Information Coordinator Technical Aids (TIC TECHAIDs). The project ensures NAVSEA/PEOs are delivering mature and interoperable warfare systems at the platform and Strike Group levels, with NAVSEA providing Strike Force interoperability certification and assessments. This project focuses on new systems and platforms under development. Interoperability Assessments of deploying ships in Strike Force configurations are accomplished through the utilization of the Navy's DIIAC, located at multiple Navy land-based sites located | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603582N / *Combat System Integration* | **Project (Number/Name)**<br>0164 / *Combat System Integration* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| across the country and connected via networking technology, and that provides operational configurations for all naval combat systems. It is a U.S. Fleet Forces Command requirement that all Strike Forces undergo Interoperability Assessment Testing in the DIIAC prior to deployment. The DIIAC provides the only opportunity for comprehensive interoperability testing of combat system and C5I configuration items prior to shipboard delivery for operational use in surface combatant platforms and Strike Groups. DIIAC, with its ability to test systems in a Strike Group environment, is funded to support the warfare system's acquisition community to test their developmental items for interoperability. However, in this instance, while funds are provided to test the item in a Strike Group environment, funds are not provided for subsequent data analysis and risk assessment, as this is the cognizant acquisition program's responsibility. When the acquisition development is complete and corrections are made, DIIAC will then fund for the full interoperability certification testing of the baseline to include the requisite warfare system analysis and risk assessments needed to obtain an Interoperability Certification. Note, this effort also supports and feeds into the development of Fleet Tactical Tools such as Capabilities & Limitations (C&L) and Tactical Information Coordinator Technical Aids (TIC TECHAIDs), which ensure that operators understand the interoperability capabilities and limitations of their combat systems. C&Ls are published for all Strike Groups, Independent Deployers, and their Coalition and Joint partners. TIC TECHAIDS are delivered to deploying Strike Group ships prior to workups and then a final copy is provided prior to deployment. C&L and TIC TECHAIDS are the final report-out to Fleet operators of the acquisition community's efforts. They are used on a daily basis in every operational theater, as well as in every Navy and Joint Schoolhouse. Note, the DIIAC infrastructure is available, but not funded to support the surface Navy's participation in the Joint Testing Environments as well as the Maritime Theater Missile Defense (MTMD) Coalition Forces interoperability testing. This project also supports the stand-up and initial activities of the Digital Warfare (DW) to set Model Based Systems Engineering (MBSE) requirements, prioritize resources, and lead efforts on information interoperability and human/machine teaming.<br><br>***FY 2018 Plans:***<br>(1) Conduct two (2) Interoperability Land-Based test events including the following:<br>-Development interoperability test to support for ACS 9.C2.0 (B24) ; ACS 9.A2.1 (B27) ; ACS 9.C2.1 (B27) ; AEGIS 5.4; SSDS 10.10.05 (CVN 78 Configuration)<br>-Certification Interoperability test for ACS 9.A2.0A/9.A2.1B (B24) ; ACS 9.C2.0 (B24); ACS 9.A2.1 (B27) ; ACS 9.C2.1 (B27)<br>-Certification Interoperability Risk assessment & Report for ACS ACS BL 9A2A/9A2B (B24) ; and SSDS 10.10.04 (LHD 2/CVN 72 Configuration)<br>(2) Complete C&L, normally a near constant yearly demand requirement, also addressed AEGIS Ashore. This will result in updates to Interoperability C&L for: | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603582N / *Combat System Integration* | **Project (Number/Name)**<br>0164 / *Combat System Integration* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| -Twenty-Three (23) Deploying Strike Group Ships (from a database containing 179 U.S. Surface Ships),<br>-Ten (10) Naval Air Squadrons (covering F/A-18s, F-35, E-2Cs, E-2Ds, MH-60Ss, MH-60Rs, EA-6Bs, EA-18Gs, P-3Cs and<br>P-8As),<br>-AEGIS Ashore (Romania(update), Poland(initial) and Pacific Missile Range Facility (initial)).<br>(3) Provide annual deliveries of Initial/Draft/Final TIC TECHAIDS to:<br>-Four (4) Carrier Strike Groups (CSG's) Twenty Two (22) Ships<br>-Three (3) Amphibious Ready Group's (ARG's) Six (6) Ships<br>-Thirty (30) BMD Ships<br>-Fourteen (14) Forward Deployed Naval Force (FDNF) Ships<br>- Forty Nine (49) Independent Deployers (CVN, CG, DDG, LCC and LCS)<br>-Aegis Ashore Site (Romania)<br>-Four (4) Fleet Area Control and Surveillance Facilities (FACSFAC's)<br>-Six (6) Fleet Maritime Operations Centers (MOC's) sites.<br>(4) Plan to conduct engineering to support two (2) systems Verification and Validation Tests. | | | | | |
| ***FY 2019 Base Plans:***<br>1) Conduct three (3) Interoperability Land-Based test events including the following:<br>-Development interoperability test to support for ACS 9.C2.2 (B30), SSDS 10.10.05 (CVN 78 Configuration), DDG 1000 (B8.5)<br>-Certification Interoperability test for ACS 9.C2.1 (B27), ACS 9.A2.1 (B27), AEGIS 5.4, LCS Freedom BL 3.2, DDG 1000 (B8.5)<br>-Certification Interoperability Risk assessment & Report for ACS 9.C2.0 (B24) and LCS Independence 6.X<br>(2) Complete C&L and TIC TECHAIDS, normally a near constant yearly demand requirement, also addressed AEGIS<br>Ashore. This will result in updates to Interoperability C&L for:<br>-Twenty three (23) Deploying Strike Group Ships (from a database containing 185 U.S. Surface Ships),<br>-Ten (10) Naval Air Squadrons (covering F/A-18s, F-35, E-2Cs, E-2Ds, MH-60Ss, MH-60Rs, EA-6Bs, EA-18Gs, P-3Cs and<br>P-8As),<br>-AEGIS Ashore (Romania, Poland(update) and Pacific Missile Range Facility(update).<br>(3) Provide annual deliveries of Initial/Draft/Final TIC TECHAIDS to:<br>-Three (3) Carrier Strike Groups (CSG's) Sixteen (16) Ships<br>-Four (4) Amphibious Ready Group's (ARG's) Eight (8) Ships | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603582N / *Combat System Integration* | **Project (Number/Name)**<br>0164 / *Combat System Integration* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| -Thirty-One (31) BMD Ships<br>-Fourteen (14) Forward Deployed Naval Force (FDNF) Ships<br>- Fifty-Three (53) Independent Deploying Ships (CVN, CG, DDG, LCCS and LCS)<br>-Aegis Ashore Site (Romania)<br>-Four (4) Fleet Area Control and Surveillance Facilities (FACSFAC's)<br>-Six (6) Fleet Maritime Operations Centers (MOC's) sites.<br>(4) Plan to conduct engineering to support two (2) systems Verification and Validation Tests.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Reduction due to DON 19 RDTEN Underexecution Review and Purchase Inflation Rate Change. | | | | | |
| ***Title:*** Warfare Systems Certification | 4.019 | 2.954 | 2.454 | 0.000 | 2.454 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** This project funds the conduct of Warfare Systems Certifications against set evaluation criteria. The project includes providing operational risk assessments, using Objective Quality Evidence (OQE), to ensure installation readiness and deployment readiness of warfare systems and Navy surface ships. NAVSEA accomplishes these efforts through Warfare System Certification Plans (WSCP), Warfare Systems Certification Readiness Reviews (WSCRR), Warfare Systems Installation Assessment (WSIA), and Warfare Systems Certification Decisions (WSCD) to support the installation and deployment of warfare systems in Navy surface platforms. This also ensures that aggregate deficiencies and workarounds do not render the operator ineffective by conducting an analysis of all work-arounds documented in Tactics, Techniques, and Procedures (TTPs), Capabilities & Limitations (C&L), and Trouble Reports (TR).<br>***FY 2018 Plans:***<br>(1) Conduct Warfare Systems Certifications for subset of the twenty (20) criteria for one hundred one (101) ships efforts for approximately one hundred sixty three (157) Warfare Systems Certification Events (WSCRRs, WSIAs, and<br>WSCDs) and fifty six (50) WSCPs for above ship classes.<br>(2) Achieve significant WSCERT execution efficiencies through workforce streamlining initiatives related to WSCERT, criteria management and consolidation of WSCERT events. The program will be able to achieve significant WSCERT execution efficiencies thereby enabling completion of more events per investment dollar.<br>***FY 2019 Base Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603582N / *Combat System Integration* | **Project (Number/Name)**<br>0164 / *Combat System Integration* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| (1) Conduct Warfare Systems Certifications Events for a subset of twenty (20) criteria for one hundred one (101) ships<br>efforts for approximately one hundred sixty three (163) Warfare Systems Certification Events (WSCRRs, WSIAs, and<br>WSCDs) and fifty six (56) WSCPs for above ship classes.<br>(2) Update the NWSCP and implement revised Naval Warfare Systems Certification Policy.<br>(3) Continue to achieve significant WSCERT execution efficiencies through workforce streamlining initiatives related to WSCERT Criteria management and consolidation of WSCERT events thereby enabling completion of more events per investment dollar, thereby enabling sustainment of certification requirements amidst a shrinking budget.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Reduction due to DON19 RDTEN Underexecution Review and Inflation Rate Change. | | | | | |
| ***Title:*** Warfare Systems Cybersecurity | 2.879 | 0.973 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** The required assessment and characterization of aggregate levels of risk for ships is specified to be accomplished at the Warfare Systems System of Systems (SoS) level and will be part of the requirements identified in the Naval Warfare Systems Certification of Navy Aircraft Carriers and Surface Combatants. Cybersecurity assessment activities began FY16.<br><br>Cybersecurity Assessment at the SoS level will entail:<br><br>(1) Establishing and collecting metrics to characterize Warfare Systems ability to protect, detect, react, and restore capabilities, as well as analyze the mission effects induced by the cyber threat activity.<br><br>(2) Maintain, improve and refine the methodologies, tools, and techniques used to conduct such risk assessments appropriate to ship warfare systems baselines and representative strike group interoperability requirements.<br><br>(3) Conduct an assessment of developmental and operational warfare systems. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603582N / *Combat System Integration* | **Project (Number/Name)**<br>0164 / *Combat System Integration* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***FY 2018 Plans:***<br>(1) Develop performance metrics for both Cyber PROTECT and RECOVER requirements.<br>(2) Conduct Cybersecurity Assessments on Thirty (30) Ships.<br>(3) Develop CYBER TECHAIDS for Thirty-Three (33) Ships.<br>(4) Develop CYBER CAPS&LIMS for Thirty-Three (33) Ships.<br>***FY 2019 Base Plans:***<br>N/A<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Reduction due to DON19 RDTEN Underexecution Review and Inflation Rate Change. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 23.839 | 20.274 | 16.351 | 0.000 | 16.351 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • OPN 2960: *ICSTF: Integrated Combat System Test Facility* | 8.376 | 5.019 | 6.251 | - | 6.251 | 6.167 | 5.981 | 6.135 | 6.276 | 0.000 | 79.751 |

**Remarks**

**D. Acquisition Strategy**

RDTEN funding under this line supports independent certification of the integration of major capability upgrades acquired by Program Executive Offices (PEOs) into host Navy Platforms and Strike Forces. The RDTEN engineering and certification activities at field sites do not involve direct procurement of equipment or engineering services, and hence no acquisition strategy is required. The major capability upgrades evaluated under this program fall under their associated PEOs' acquisition strategies.

**E. Performance Metrics**

Quarterly Program Reviews and Baseline Assessments

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603582N / *Combat System Integration* | Project (Number/Name)<br>0164 / *Combat System Integration* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SF Requirements Engineering & Analysis | WR | NSWCs : DN/PHD/ Corona | 5.157 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 5.157 | - |
| SF Requirements Engineering & Analysis | WR | Non-NSWCs : Various | 5.295 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 5.295 | - |
| Platform/Strike Force Certification | WR | NSWCs : DD/ICSTD/ DN/Corona | 39.732 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 39.732 | - |
| Platform/Strike Force Certification | WR | Non-NSWCs : Various | 27.843 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 27.843 | - |
| Fleet Response Plan (FRP) | WR | NSWCs : DD/PHD/ DN | 27.030 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 27.030 | - |
| Fleet Response Plan (FRP) | WR | Non-NSWCs : Various | 3.793 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.793 | - |
| Combat Systems Cert ISO Platform Cert | WR | NSWCs : DN/DD/ PHD/Corona | 24.640 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 24.640 | - |
| Combat Systems Cert ISO Platform Cert | WR | Non-NSWCs : Various | 1.853 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.853 | - |
| C5IMP & Fleet Readiness | WR | NSWCs : PHD | 9.010 | 3.252 | Nov 2016 | 3.036 | Nov 2017 | 2.700 | Nov 2018 | - | | 2.700 | Continuing | Continuing | Continuing |
| C5IMP & Fleet Readiness | C/CPFF | Non-NSWCs : Various | 0.000 | 0.000 | | 0.240 | Dec 2017 | 0.209 | Dec 2018 | - | | 0.209 | 0.000 | 0.449 | - |
| Warfare Systems Certification | WR | NSWCs : DD/Crane | 17.413 | 0.719 | Nov 2016 | 0.671 | Nov 2017 | 0.308 | Nov 2018 | - | | 0.308 | Continuing | Continuing | Continuing |
| Warfare Systems Certification | WR | Non-NSWCs : Various | 3.500 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| CNI/Design Agent | SS/CPAF | General Dynamics : Not Specified | 47.926 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 47.926 | - |
| CNI/Software Engineering | WR | NSWC : Dahlgren | 8.383 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 8.383 | - |
| CNI/Test and Evaluation | WR | CDSA : Not Specified | 3.922 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.922 | - |
| CNI/Systems Engineering | WR | NSWC : PHD | 2.645 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.645 | - |
| CNI/Miscellaneous | WR | Various : Not Specified | 7.529 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 7.529 | - |
| OA Automated Test and Retest | WR | NSWCs : Various | 17.500 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 17.500 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603582N / *Combat System Integration* | Project (Number/Name)<br>0164 / *Combat System Integration* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Contract Engineering Support | C/CPFF | Gryphon Technology : VA | 30.891 | 5.093 | Jan 2017 | 5.034 | Jan 2018 | 4.410 | Jan 2019 | - | | 4.410 | Continuing | Continuing | Continuing |
| Contract Program Management Support | C/CPFF | Delta Resources Inc. : VA | 8.141 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 8.141 | - |
| Travel | Allot | NAVSEA HQ : Washington, DC | 2.330 | 0.021 | Jan 2017 | 0.020 | Jan 2018 | 0.019 | Jan 2019 | - | | 0.019 | 0.000 | 2.390 | - |
| Interoperability Fixes | WR | NSWCs : Various | 1.500 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.500 | - |
| TIC TECHAIDS | WR | CSC : VA | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Warfare Systems Cybersecurity | WR | NSWCs : PHD, Dahlren & Corna | 2.456 | 1.979 | Jan 2017 | 0.973 | Jan 2018 | 0.000 | Jan 2019 | - | | 0.000 | 0.000 | 5.408 | - |
| Capabilities & Limitations | WR | NSWCs : PHD | 5.292 | 3.332 | Nov 2016 | 3.110 | Nov 2017 | 2.642 | Nov 2018 | - | | 2.642 | 0.000 | 14.376 | - |
| Cybersecurity IA | C/CPFF | CSC : VA | 0.544 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.544 | - |
| | | **Subtotal** | 304.325 | 14.396 | | 13.084 | | 10.288 | | - | | 10.288 | Continuing | Continuing | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Combat System Integration Testing (CSIT) | WR | NSWCs : DD/ICSTF | 5.736 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 5.736 | - |
| Interoperability Certification Assessment | WR | NSWCs : DD/ SPAWAR/San Diego | 26.804 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Navigation System Certification | WR | SPAWAR : Charleston, SC | 9.257 | 1.657 | Nov 2016 | 1.547 | Nov 2017 | 1.282 | Nov 2018 | - | | 1.282 | 0.000 | 13.743 | - |
| DIIAC Engineering and Operations | WR | NSWCs : DD/DN/ SPAWAR | 20.323 | 1.496 | Jan 2017 | 2.050 | Jan 2018 | 1.779 | Jan 2019 | - | | 1.779 | Continuing | Continuing | Continuing |
| DEP Engineering and Operations | WR | NSWCs : Various | 12.623 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 12.623 | - |
| Interoperability Cert Assessment | WR | NSWCs : DD/DN/ Corona | 4.159 | 2.024 | Nov 2016 | 2.542 | Nov 2017 | 2.058 | Nov 2018 | - | | 2.058 | 0.000 | 10.783 | - |
| Interoperability Cert Assessment | C/CPFF | Non-NSWCS : CNA | 1.249 | 1.268 | Jan 2017 | 0.764 | Jan 2018 | 0.730 | Jan 2019 | - | | 0.730 | 0.000 | 4.011 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603582N / *Combat System Integration* | Project (Number/Name)<br>0164 / *Combat System Integration* | |

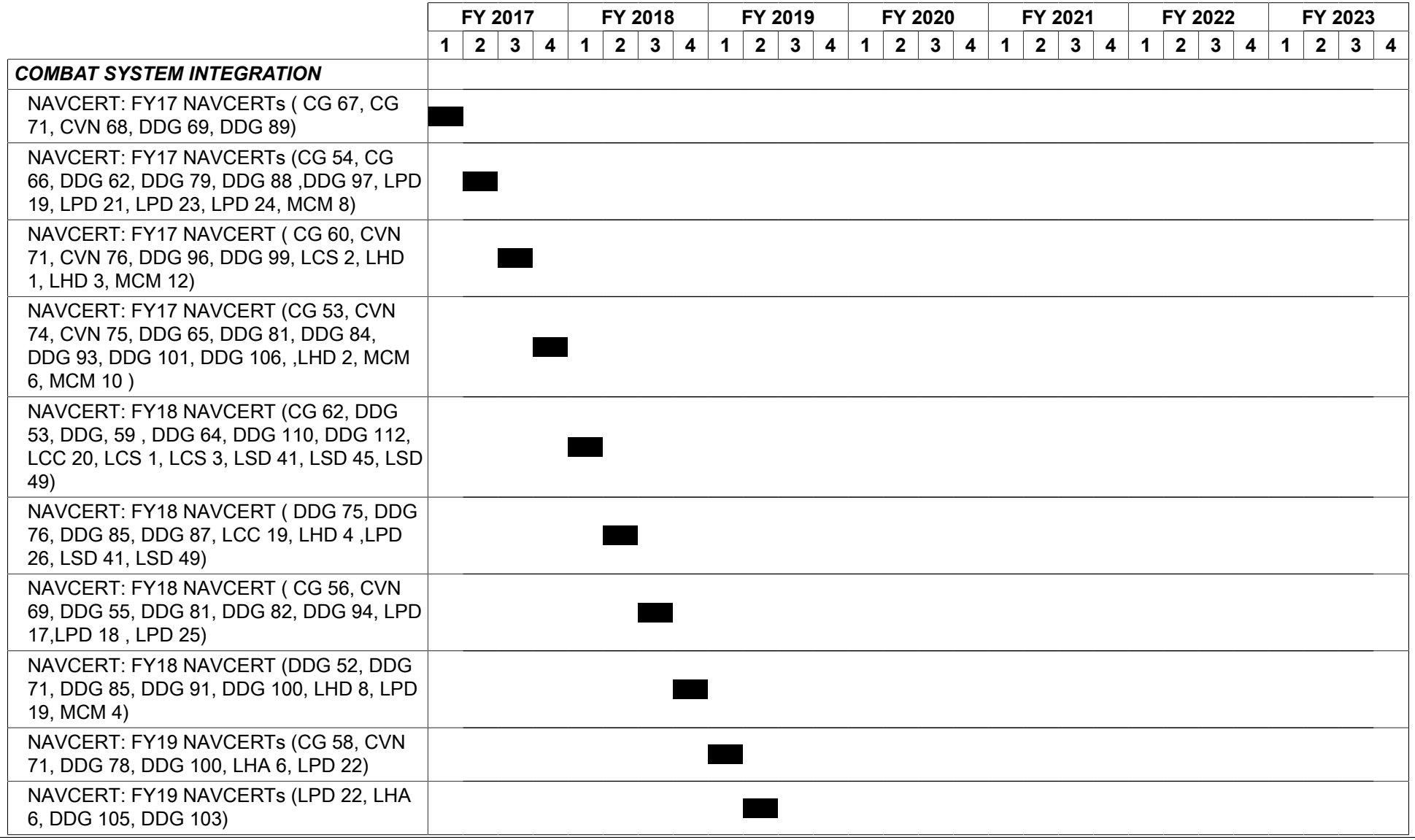
**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Interoperability Cert Assessment | C/CPFF | CSC : Washington, DC | 0.469 | 0.307 | Jan 2017 | 0.287 | Jan 2018 | 0.214 | Jan 2019 | - | | 0.214 | 0.000 | 1.277 | - |
| Interoperability Cert Assessment | WR | NUWCs : Keyport | 0.000 | 1.268 | Jun 2017 | 0.000 | Jun 2018 | 0.000 | Jun 2019 | - | | 0.000 | 0.000 | 1.268 | - |
| Interoperability Cert Assessment | WR | NSWCs : Crane/ Dahlgren | 0.000 | 0.771 | Jun 2017 | 0.000 | Jun 2018 | 0.000 | Jun 2019 | - | | 0.000 | 0.000 | 0.771 | - |
| Interoperability Cert Assessment | C/CPFF | Various : Various | 0.000 | 0.652 | Sep 2017 | 0.000 | Sep 2018 | 0.000 | Sep 2019 | - | | 0.000 | 0.000 | 0.652 | - |
| | | **Subtotal** | 80.620 | 9.443 | | 7.190 | | 6.063 | | - | | 6.063 | Continuing | Continuing | N/A |

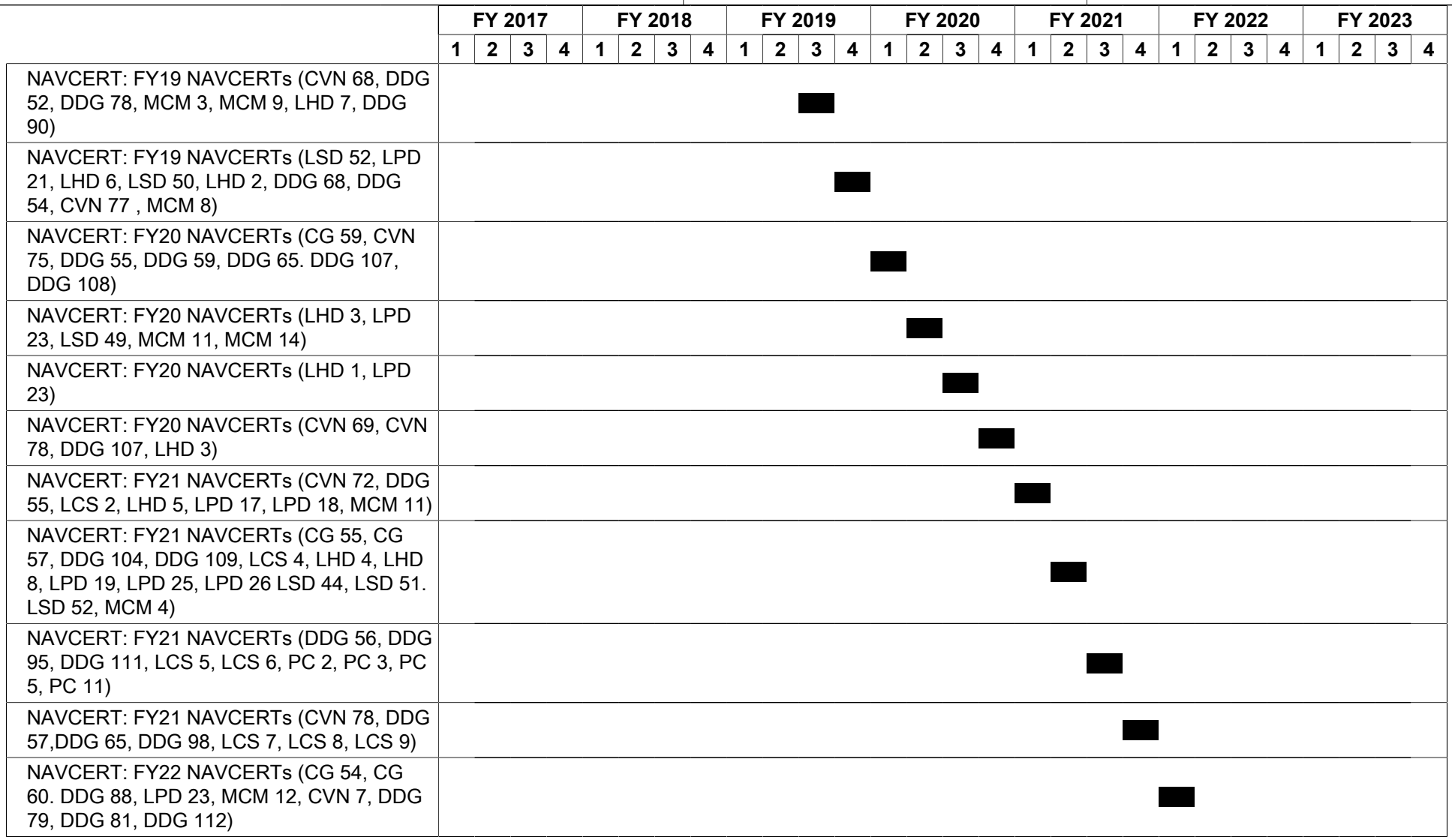
| | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 384.945 | 23.839 | | 20.274 | | 16.351 | | - | | 16.351 | Continuing | Continuing | N/A |

**Remarks**

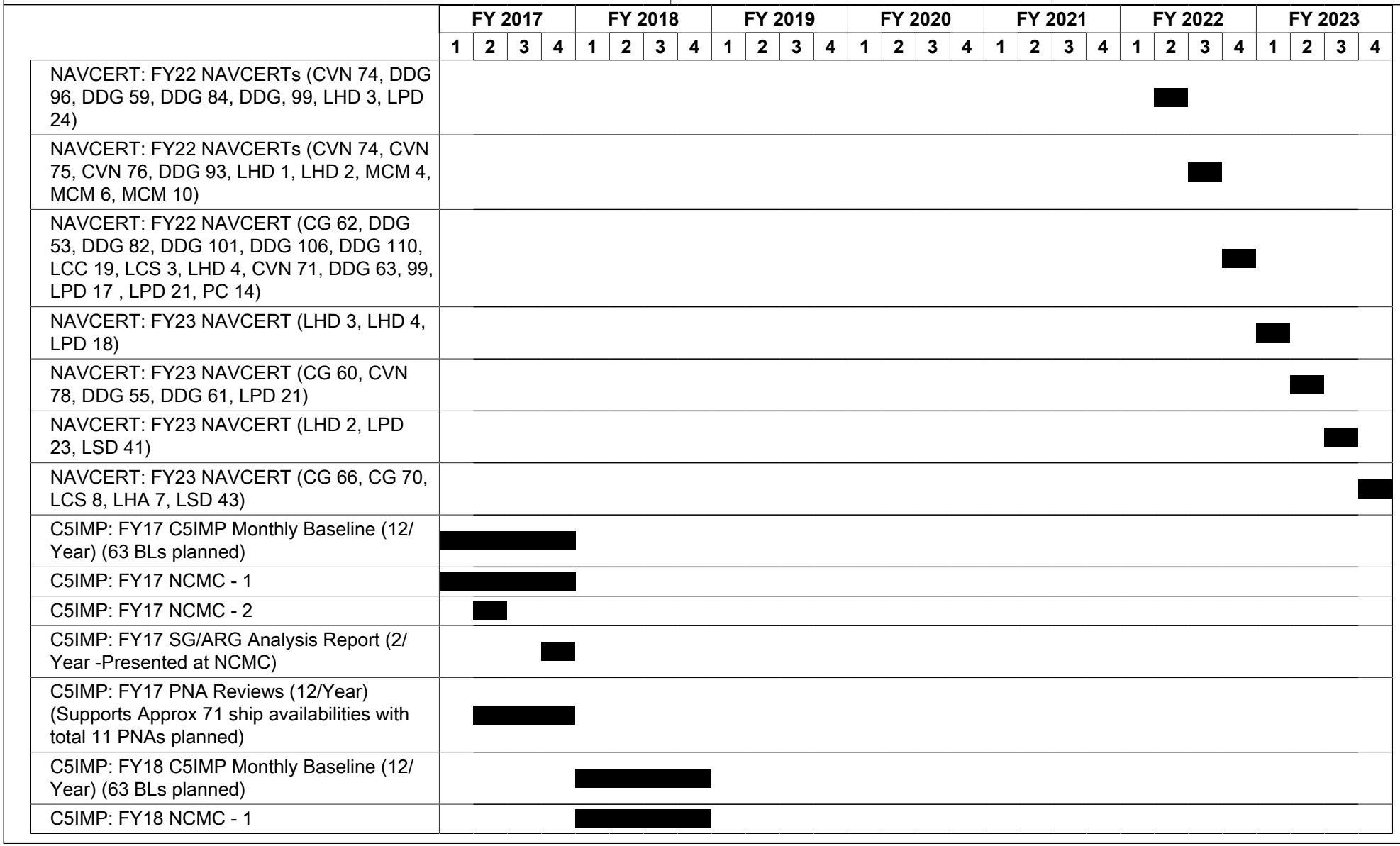
| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603582N / *Combat System Integration* | **Project (Number/Name)**<br>0164 / *Combat System Integration* |



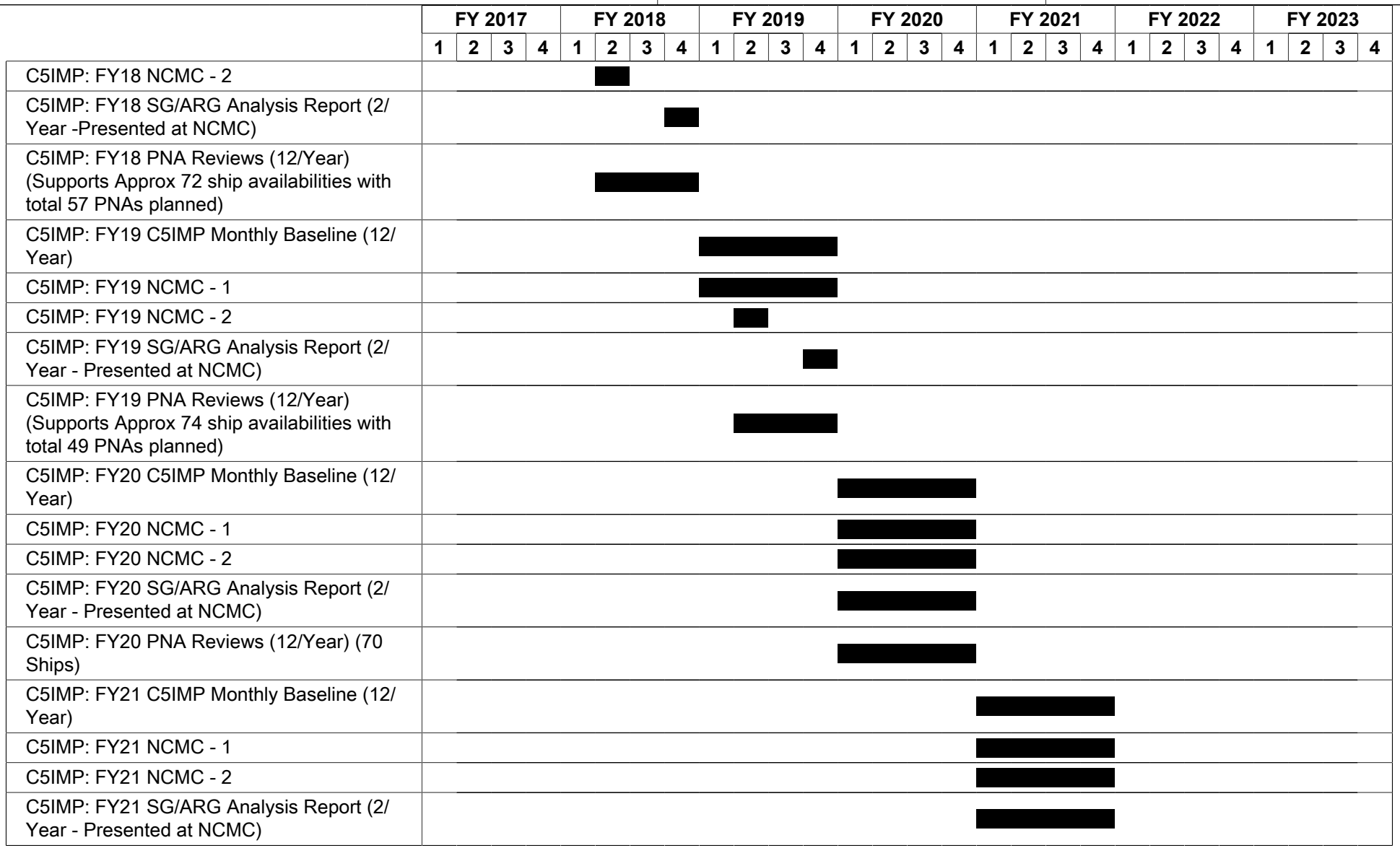
| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603582N / *Combat System Integration* | **Project (Number/Name)**<br>0164 / *Combat System Integration* |



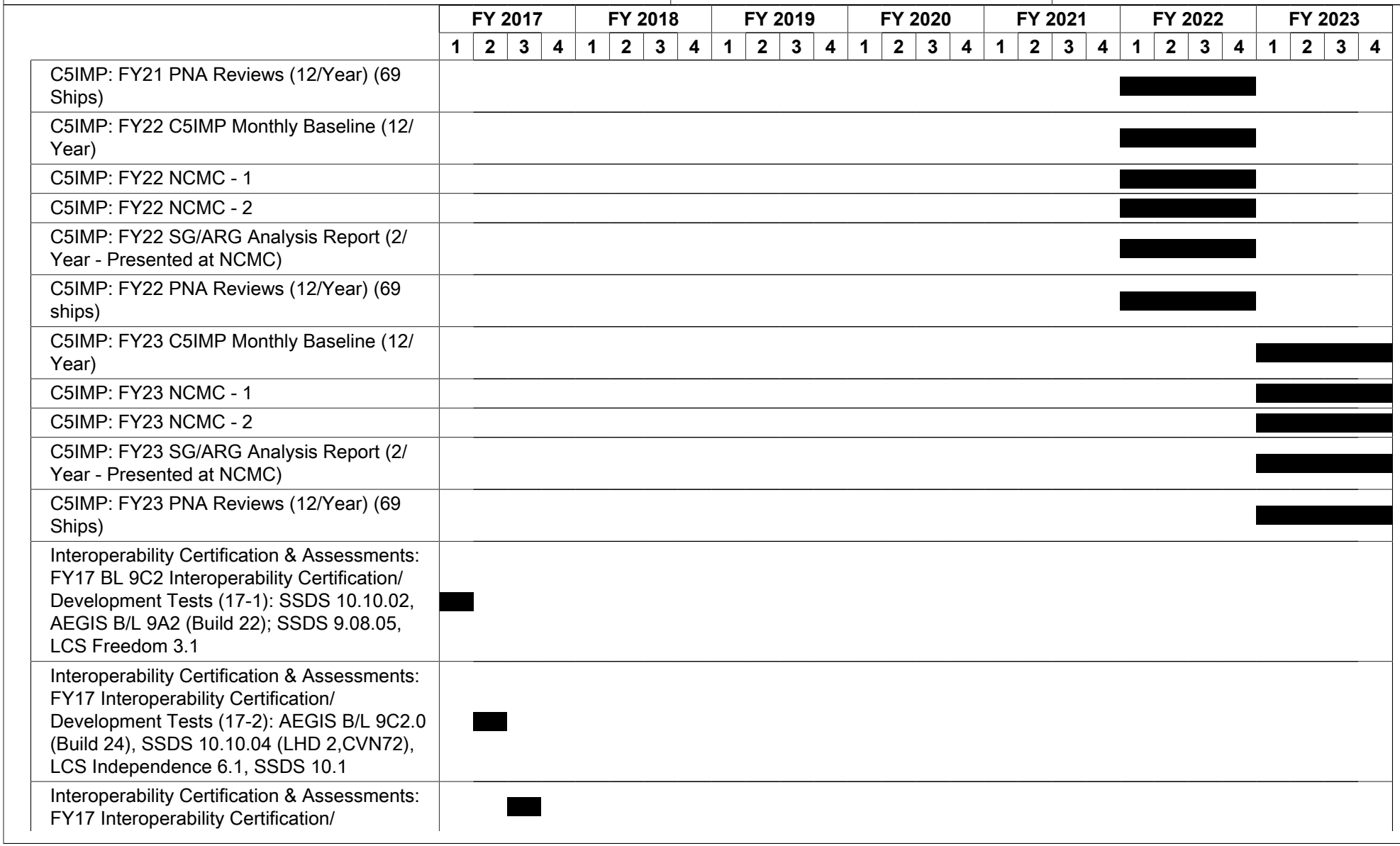
| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603582N / *Combat System Integration* | **Project (Number/Name)**<br>0164 / *Combat System Integration* |



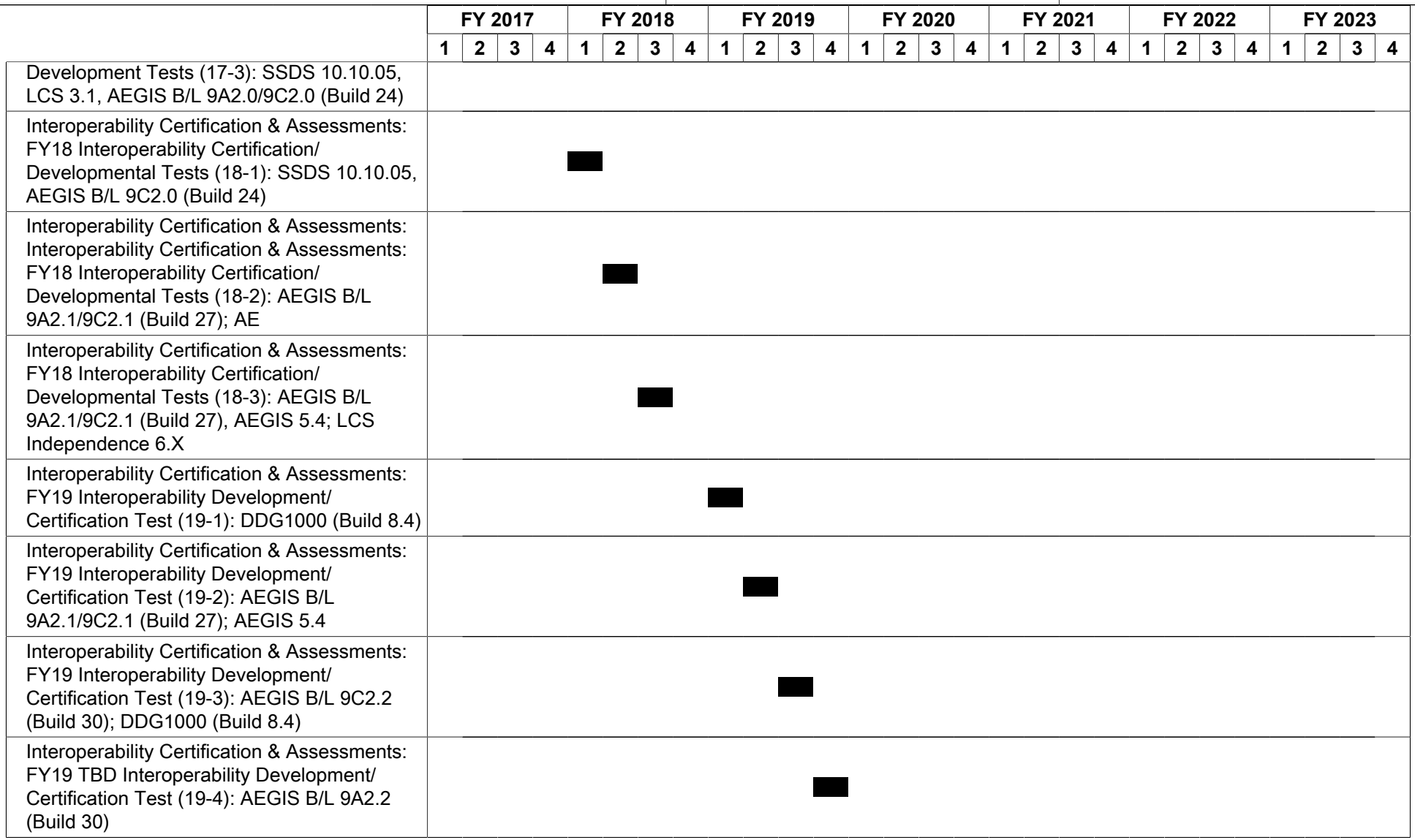
| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603582N / *Combat System Integration* | **Project (Number/Name)**<br>0164 / *Combat System Integration* |



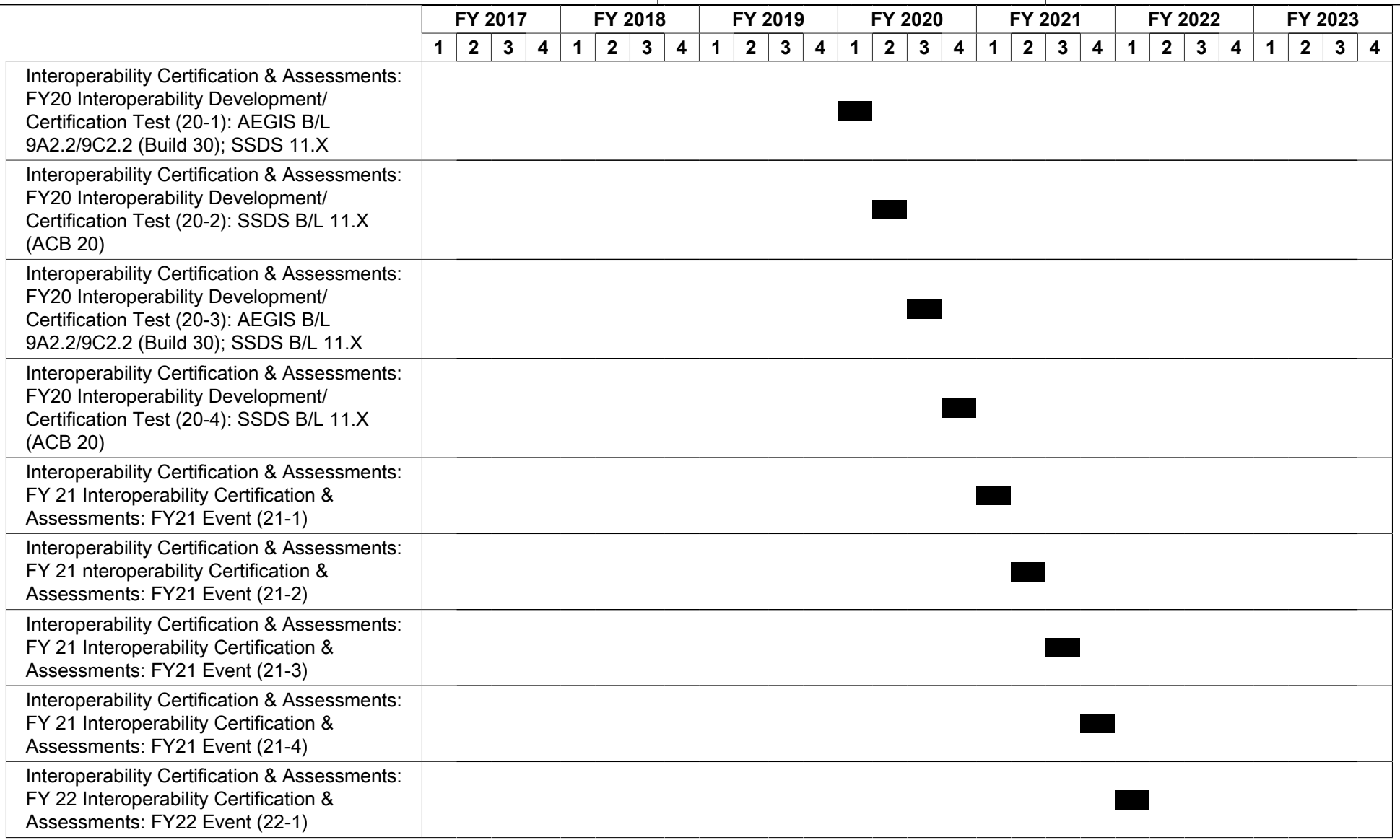
| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603582N / *Combat System Integration* | **Project (Number/Name)**<br>0164 / *Combat System Integration* |



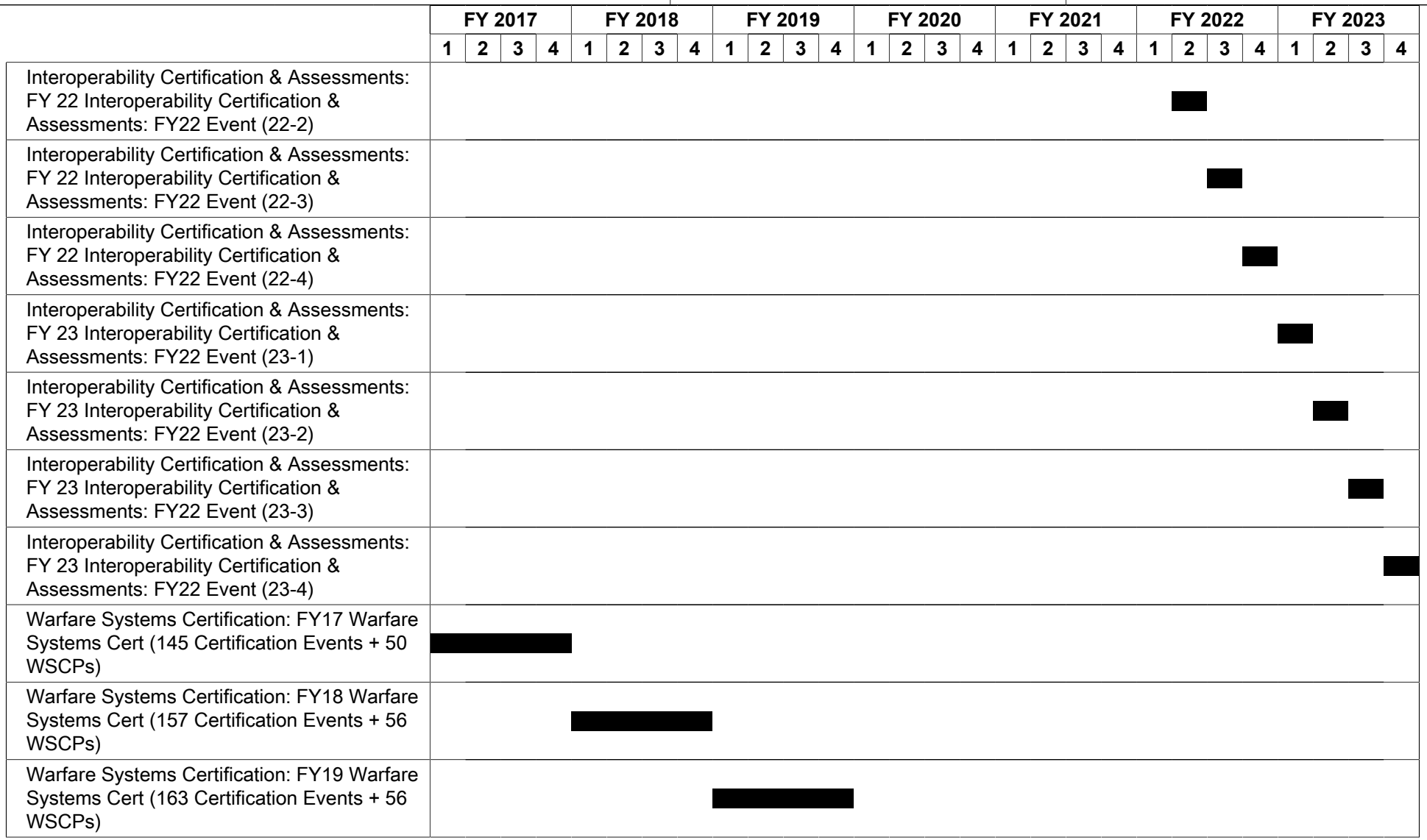
| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603582N / *Combat System Integration* | **Project (Number/Name)**<br>0164 / *Combat System Integration* |



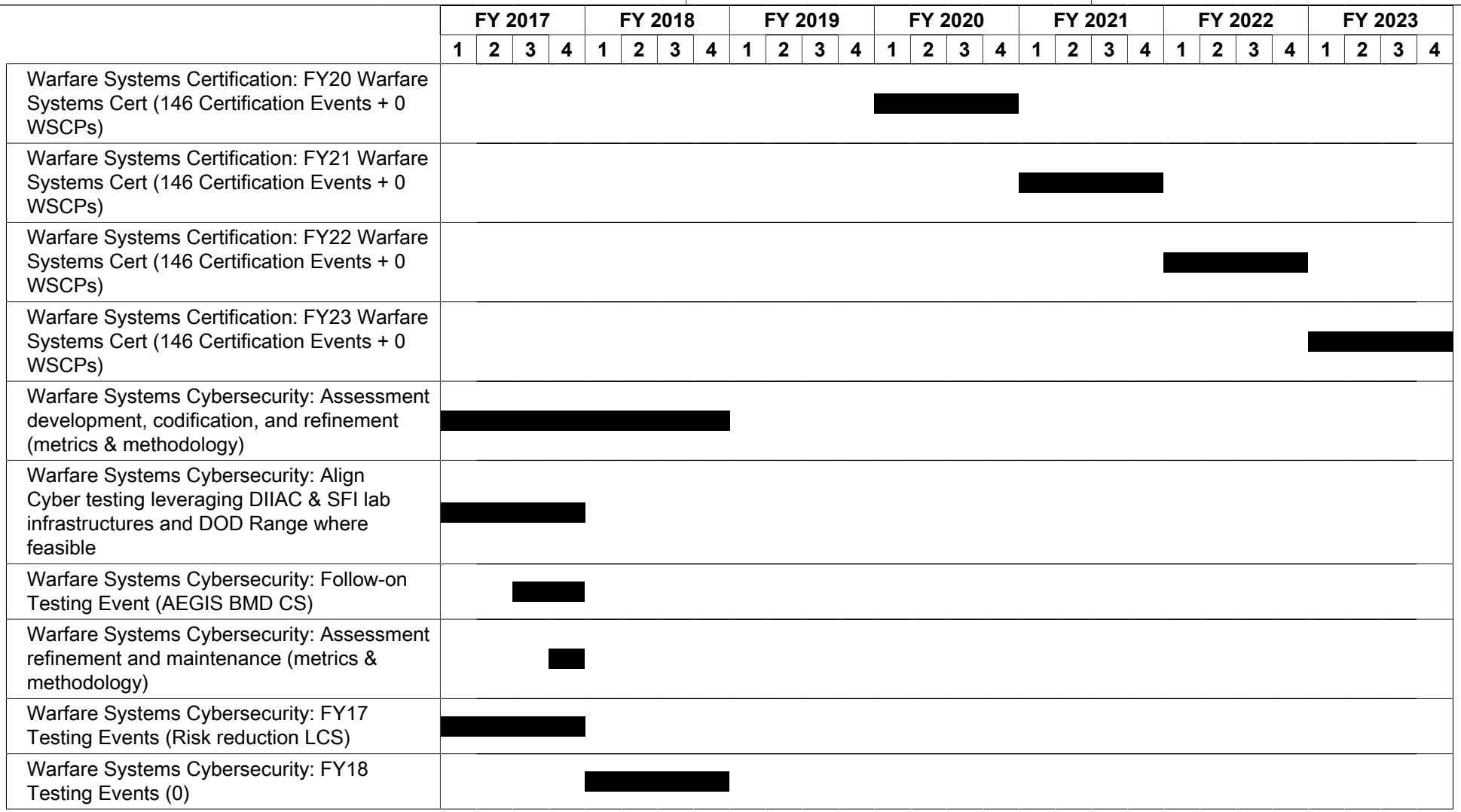
| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603582N / *Combat System Integration* | **Project (Number/Name)**<br>0164 / *Combat System Integration* |



| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603582N / *Combat System Integration* | **Project (Number/Name)**<br>0164 / *Combat System Integration* |



| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603582N / *Combat System Integration* | **Project (Number/Name)**<br>0164 / *Combat System Integration* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603582N / *Combat System Integration* | **Project (Number/Name)**<br>0164 / *Combat System Integration* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***COMBAT SYSTEM INTEGRATION*** | | | | |
| NAVCERT: FY17 NAVCERTs ( CG 67, CG 71, CVN 68, DDG 69, DDG 89) | 1 | 2017 | 1 | 2017 |
| NAVCERT: FY17 NAVCERTs (CG 54, CG 66, DDG 62, DDG 79, DDG 88 ,DDG 97, LPD 19, LPD 21, LPD 23, LPD 24, MCM 8) | 2 | 2017 | 2 | 2017 |
| NAVCERT: FY17 NAVCERT ( CG 60, CVN 71, CVN 76, DDG 96, DDG 99, LCS 2, LHD 1, LHD 3, MCM 12) | 3 | 2017 | 3 | 2017 |
| NAVCERT: FY17 NAVCERT (CG 53, CVN 74, CVN 75, DDG 65, DDG 81, DDG 84, DDG 93, DDG 101, DDG 106, ,LHD 2, MCM 6, MCM 10 ) | 4 | 2017 | 4 | 2017 |
| NAVCERT: FY18 NAVCERT (CG 62, DDG 53, DDG, 59 , DDG 64, DDG 110, DDG 112, LCC 20, LCS 1, LCS 3, LSD 41, LSD 45, LSD 49) | 1 | 2018 | 1 | 2018 |
| NAVCERT: FY18 NAVCERT ( DDG 75, DDG 76, DDG 85, DDG 87, LCC 19, LHD 4 ,LPD 26, LSD 41, LSD 49) | 2 | 2018 | 2 | 2018 |
| NAVCERT: FY18 NAVCERT ( CG 56, CVN 69, DDG 55, DDG 81, DDG 82, DDG 94, LPD 17,LPD 18 , LPD 25) | 3 | 2018 | 3 | 2018 |
| NAVCERT: FY18 NAVCERT (DDG 52, DDG 71, DDG 85, DDG 91, DDG 100, LHD 8, LPD 19, MCM 4) | 4 | 2018 | 4 | 2018 |
| NAVCERT: FY19 NAVCERTs (CG 58, CVN 71, DDG 78, DDG 100, LHA 6, LPD 22) | 1 | 2019 | 1 | 2019 |
| NAVCERT: FY19 NAVCERTs (LPD 22, LHA 6, DDG 105, DDG 103) | 2 | 2019 | 2 | 2019 |
| NAVCERT: FY19 NAVCERTs (CVN 68, DDG 52, DDG 78, MCM 3, MCM 9, LHD 7, DDG 90) | 3 | 2019 | 3 | 2019 |
| NAVCERT: FY19 NAVCERTs (LSD 52, LPD 21, LHD 6, LSD 50, LHD 2, DDG 68, DDG 54, CVN 77 , MCM 8) | 4 | 2019 | 4 | 2019 |
| NAVCERT: FY20 NAVCERTs (CG 59, CVN 75, DDG 55, DDG 59, DDG 65. DDG 107, DDG 108) | 1 | 2020 | 1 | 2020 |
| NAVCERT: FY20 NAVCERTs (LHD 3, LPD 23, LSD 49, MCM 11, MCM 14) | 2 | 2020 | 2 | 2020 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603582N / *Combat System Integration* | **Project (Number/Name)**<br>0164 / *Combat System Integration* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| NAVCERT: FY20 NAVCERTs (LHD 1, LPD 23) | 3 | 2020 | 3 | 2020 |
| NAVCERT: FY20 NAVCERTs (CVN 69, CVN 78, DDG 107, LHD 3) | 4 | 2020 | 4 | 2020 |
| NAVCERT: FY21 NAVCERTs (CVN 72, DDG 55, LCS 2, LHD 5, LPD 17, LPD 18, MCM 11) | 1 | 2021 | 1 | 2021 |
| NAVCERT: FY21 NAVCERTs (CG 55, CG 57, DDG 104, DDG 109, LCS 4, LHD 4, LHD 8, LPD 19, LPD 25, LPD 26 LSD 44, LSD 51. LSD 52, MCM 4) | 2 | 2021 | 2 | 2021 |
| NAVCERT: FY21 NAVCERTs (DDG 56, DDG 95, DDG 111, LCS 5, LCS 6, PC 2, PC 3, PC 5, PC 11) | 3 | 2021 | 3 | 2021 |
| NAVCERT: FY21 NAVCERTs (CVN 78, DDG 57,DDG 65, DDG 98, LCS 7, LCS 8, LCS 9) | 4 | 2021 | 4 | 2021 |
| NAVCERT: FY22 NAVCERTs (CG 54, CG 60. DDG 88, LPD 23, MCM 12, CVN 7, DDG 79, DDG 81, DDG 112) | 1 | 2022 | 1 | 2022 |
| NAVCERT: FY22 NAVCERTs (CVN 74, DDG 96, DDG 59, DDG 84, DDG, 99, LHD 3, LPD 24) | 2 | 2022 | 2 | 2022 |
| NAVCERT: FY22 NAVCERTs (CVN 74, CVN 75, CVN 76, DDG 93, LHD 1, LHD 2, MCM 4, MCM 6, MCM 10) | 3 | 2022 | 3 | 2022 |
| NAVCERT: FY22 NAVCERT (CG 62, DDG 53, DDG 82, DDG 101, DDG 106, DDG 110, LCC 19, LCS 3, LHD 4, CVN 71, DDG 63, 99, LPD 17 , LPD 21, PC 14) | 4 | 2022 | 4 | 2022 |
| NAVCERT: FY23 NAVCERT (LHD 3, LHD 4, LPD 18) | 1 | 2023 | 1 | 2023 |
| NAVCERT: FY23 NAVCERT (CG 60, CVN 78, DDG 55, DDG 61, LPD 21) | 2 | 2023 | 2 | 2023 |
| NAVCERT: FY23 NAVCERT (LHD 2, LPD 23, LSD 41) | 3 | 2023 | 3 | 2023 |
| NAVCERT: FY23 NAVCERT (CG 66, CG 70, LCS 8, LHA 7, LSD 43) | 4 | 2023 | 4 | 2023 |
| C5IMP: FY17 C5IMP Monthly Baseline (12/Year) (63 BLs planned) | 1 | 2017 | 4 | 2017 |
| C5IMP: FY17 NCMC - 1 | 1 | 2017 | 4 | 2017 |
| C5IMP: FY17 NCMC - 2 | 2 | 2017 | 2 | 2017 |
| C5IMP: FY17 SG/ARG Analysis Report (2/Year -Presented at NCMC) | 4 | 2017 | 4 | 2017 |
| C5IMP: FY17 PNA Reviews (12/Year) (Supports Approx 71 ship availabilities with total 11 PNAs planned) | 2 | 2017 | 4 | 2017 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603582N / *Combat System Integration* | **Project (Number/Name)**<br>0164 / *Combat System Integration* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| C5IMP: FY18 C5IMP Monthly Baseline (12/Year) (63 BLs planned) | 1 | 2018 | 4 | 2018 |
| C5IMP: FY18 NCMC - 1 | 1 | 2018 | 4 | 2018 |
| C5IMP: FY18 NCMC - 2 | 2 | 2018 | 2 | 2018 |
| C5IMP: FY18 SG/ARG Analysis Report (2/Year -Presented at NCMC) | 4 | 2018 | 4 | 2018 |
| C5IMP: FY18 PNA Reviews (12/Year) (Supports Approx 72 ship availabilities with total 57 PNAs planned) | 2 | 2018 | 4 | 2018 |
| C5IMP: FY19 C5IMP Monthly Baseline (12/Year) | 1 | 2019 | 4 | 2019 |
| C5IMP: FY19 NCMC - 1 | 1 | 2019 | 4 | 2019 |
| C5IMP: FY19 NCMC - 2 | 2 | 2019 | 2 | 2019 |
| C5IMP: FY19 SG/ARG Analysis Report (2/Year - Presented at NCMC) | 4 | 2019 | 4 | 2019 |
| C5IMP: FY19 PNA Reviews (12/Year) (Supports Approx 74 ship availabilities with total 49 PNAs planned) | 2 | 2019 | 4 | 2019 |
| C5IMP: FY20 C5IMP Monthly Baseline (12/Year) | 1 | 2020 | 4 | 2020 |
| C5IMP: FY20 NCMC - 1 | 1 | 2020 | 4 | 2020 |
| C5IMP: FY20 NCMC - 2 | 1 | 2020 | 4 | 2020 |
| C5IMP: FY20 SG/ARG Analysis Report (2/Year - Presented at NCMC) | 1 | 2020 | 4 | 2020 |
| C5IMP: FY20 PNA Reviews (12/Year) (70 Ships) | 1 | 2020 | 4 | 2020 |
| C5IMP: FY21 C5IMP Monthly Baseline (12/Year) | 1 | 2021 | 4 | 2021 |
| C5IMP: FY21 NCMC - 1 | 1 | 2021 | 4 | 2021 |
| C5IMP: FY21 NCMC - 2 | 1 | 2021 | 4 | 2021 |
| C5IMP: FY21 SG/ARG Analysis Report (2/Year - Presented at NCMC) | 1 | 2021 | 4 | 2021 |
| C5IMP: FY21 PNA Reviews (12/Year) (69 Ships) | 1 | 2022 | 4 | 2022 |
| C5IMP: FY22 C5IMP Monthly Baseline (12/Year) | 1 | 2022 | 4 | 2022 |
| C5IMP: FY22 NCMC - 1 | 1 | 2022 | 4 | 2022 |
| C5IMP: FY22 NCMC - 2 | 1 | 2022 | 4 | 2022 |
| C5IMP: FY22 SG/ARG Analysis Report (2/Year - Presented at NCMC) | 1 | 2022 | 4 | 2022 |
| C5IMP: FY22 PNA Reviews (12/Year) (69 ships) | 1 | 2022 | 4 | 2022 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603582N / *Combat System Integration* | **Project (Number/Name)**<br>0164 / *Combat System Integration* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| C5IMP: FY23 C5IMP Monthly Baseline (12/Year) | 1 | 2023 | 4 | 2023 |
| C5IMP: FY23 NCMC - 1 | 1 | 2023 | 4 | 2023 |
| C5IMP: FY23 NCMC - 2 | 1 | 2023 | 4 | 2023 |
| C5IMP: FY23 SG/ARG Analysis Report (2/Year - Presented at NCMC) | 1 | 2023 | 4 | 2023 |
| C5IMP: FY23 PNA Reviews (12/Year) (69 Ships) | 1 | 2023 | 4 | 2023 |
| Interoperability Certification & Assessments: FY17 BL 9C2 Interoperability Certification/ Development Tests (17-1): SSDS 10.10.02, AEGIS B/L 9A2 (Build 22); SSDS 9.08.05, LCS Freedom 3.1 | 1 | 2017 | 1 | 2017 |
| Interoperability Certification & Assessments: FY17 Interoperability Certification/ Development Tests (17-2): AEGIS B/L 9C2.0 (Build 24), SSDS 10.10.04 (LHD 2,CVN72), LCS Independence 6.1, SSDS 10.1 | 2 | 2017 | 2 | 2017 |
| Interoperability Certification & Assessments: FY17 Interoperability Certification/ Development Tests (17-3): SSDS 10.10.05, LCS 3.1, AEGIS B/L 9A2.0/9C2.0 (Build 24) | 3 | 2017 | 3 | 2017 |
| Interoperability Certification & Assessments: FY18 Interoperability Certification/ Developmental Tests (18-1): SSDS 10.10.05, AEGIS B/L 9C2.0 (Build 24) | 1 | 2018 | 1 | 2018 |
| Interoperability Certification & Assessments: Interoperability Certification & Assessments: FY18 Interoperability Certification/Developmental Tests (18-2): AEGIS B/L 9A2.1/9C2.1 (Build 27); AE | 2 | 2018 | 2 | 2018 |
| Interoperability Certification & Assessments: FY18 Interoperability Certification/ Developmental Tests (18-3): AEGIS B/L 9A2.1/9C2.1 (Build 27), AEGIS 5.4; LCS Independence 6.X | 3 | 2018 | 3 | 2018 |
| Interoperability Certification & Assessments: FY19 Interoperability Development/ Certification Test (19-1): DDG1000 (Build 8.4) | 1 | 2019 | 1 | 2019 |
| Interoperability Certification & Assessments: FY19 Interoperability Development/ Certification Test (19-2): AEGIS B/L 9A2.1/9C2.1 (Build 27); AEGIS 5.4 | 2 | 2019 | 2 | 2019 |
| Interoperability Certification & Assessments: FY19 Interoperability Development/ Certification Test (19-3): AEGIS B/L 9C2.2 (Build 30); DDG1000 (Build 8.4) | 3 | 2019 | 3 | 2019 |
| Interoperability Certification & Assessments: FY19 TBD Interoperability Development/ Certification Test (19-4): AEGIS B/L 9A2.2 (Build 30) | 4 | 2019 | 4 | 2019 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603582N / *Combat System Integration* | **Project (Number/Name)**<br>0164 / *Combat System Integration* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Interoperability Certification & Assessments: FY20 Interoperability Development/ Certification Test (20-1): AEGIS B/L 9A2.2/9C2.2 (Build 30); SSDS 11.X | 1 | 2020 | 1 | 2020 |
| Interoperability Certification & Assessments: FY20 Interoperability Development/ Certification Test (20-2): SSDS B/L 11.X (ACB 20) | 2 | 2020 | 2 | 2020 |
| Interoperability Certification & Assessments: FY20 Interoperability Development/ Certification Test (20-3): AEGIS B/L 9A2.2/9C2.2 (Build 30); SSDS B/L 11.X | 3 | 2020 | 3 | 2020 |
| Interoperability Certification & Assessments: FY20 Interoperability Development/ Certification Test (20-4): SSDS B/L 11.X (ACB 20) | 4 | 2020 | 4 | 2020 |
| Interoperability Certification & Assessments: FY 21 Interoperability Certification & Assessments: FY21 Event (21-1) | 1 | 2021 | 1 | 2021 |
| Interoperability Certification & Assessments: FY 21 nteroperability Certification & Assessments: FY21 Event (21-2) | 2 | 2021 | 2 | 2021 |
| Interoperability Certification & Assessments: FY 21 Interoperability Certification & Assessments: FY21 Event (21-3) | 3 | 2021 | 3 | 2021 |
| Interoperability Certification & Assessments: FY 21 Interoperability Certification & Assessments: FY21 Event (21-4) | 4 | 2021 | 4 | 2021 |
| Interoperability Certification & Assessments: FY 22 Interoperability Certification & Assessments: FY22 Event (22-1) | 1 | 2022 | 1 | 2022 |
| Interoperability Certification & Assessments: FY 22 Interoperability Certification & Assessments: FY22 Event (22-2) | 2 | 2022 | 2 | 2022 |
| Interoperability Certification & Assessments: FY 22 Interoperability Certification & Assessments: FY22 Event (22-3) | 3 | 2022 | 3 | 2022 |
| Interoperability Certification & Assessments: FY 22 Interoperability Certification & Assessments: FY22 Event (22-4) | 4 | 2022 | 4 | 2022 |
| Interoperability Certification & Assessments: FY 23 Interoperability Certification & Assessments: FY22 Event (23-1) | 1 | 2023 | 1 | 2023 |
| Interoperability Certification & Assessments: FY 23 Interoperability Certification & Assessments: FY22 Event (23-2) | 2 | 2023 | 2 | 2023 |
| Interoperability Certification & Assessments: FY 23 Interoperability Certification & Assessments: FY22 Event (23-3) | 3 | 2023 | 3 | 2023 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603582N / *Combat System Integration* | **Project (Number/Name)**<br>0164 / *Combat System Integration* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Interoperability Certification & Assessments: FY 23 Interoperability Certification & Assessments: FY22 Event (23-4) | 4 | 2023 | 4 | 2023 |
| Warfare Systems Certification: FY17 Warfare Systems Cert (145 Certification Events + 50 WSCPs) | 1 | 2017 | 4 | 2017 |
| Warfare Systems Certification: FY18 Warfare Systems Cert (157 Certification Events + 56 WSCPs) | 1 | 2018 | 4 | 2018 |
| Warfare Systems Certification: FY19 Warfare Systems Cert (163 Certification Events + 56 WSCPs) | 1 | 2019 | 4 | 2019 |
| Warfare Systems Certification: FY20 Warfare Systems Cert (146 Certification Events + 0 WSCPs) | 1 | 2020 | 4 | 2020 |
| Warfare Systems Certification: FY21 Warfare Systems Cert (146 Certification Events + 0 WSCPs) | 1 | 2021 | 4 | 2021 |
| Warfare Systems Certification: FY22 Warfare Systems Cert (146 Certification Events + 0 WSCPs) | 1 | 2022 | 4 | 2022 |
| Warfare Systems Certification: FY23 Warfare Systems Cert (146 Certification Events + 0 WSCPs) | 1 | 2023 | 4 | 2023 |
| Warfare Systems Cybersecurity: Assessment development, codification, and refinement (metrics & methodology) | 1 | 2017 | 4 | 2018 |
| Warfare Systems Cybersecurity: Align Cyber testing leveraging DIIAC & SFI lab infrastructures and DOD Range where feasible | 1 | 2017 | 4 | 2017 |
| Warfare Systems Cybersecurity: Follow-on Testing Event (AEGIS BMD CS) | 3 | 2017 | 4 | 2017 |
| Warfare Systems Cybersecurity: Assessment refinement and maintenance (metrics & methodology) | 4 | 2017 | 4 | 2017 |
| Warfare Systems Cybersecurity: FY17 Testing Events (Risk reduction LCS) | 1 | 2017 | 4 | 2017 |
| Warfare Systems Cybersecurity: FY18 Testing Events (0) | 1 | 2018 | 4 | 2018 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | | | | | R-1 Program Element (Number/Name)<br>PE 0603582N / *Combat System Integration* | | | | Project (Number/Name)<br>3425 / *Digital Warfare* | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| 3425: *Digital Warfare* | 0.000 | 0.000 | 4.400 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 4.400 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

New Project: Digital Warfare

The Chief of Naval Operations concurred with the Task Force Netted Navy recommendation to stand up the Digital Warfare (DW) to set requirements, prioritize resources, and lead efforts on information interoperability and human/machine teaming.

NAVAIR, NAVSEA, SPAWAR, associated Program Executive Offices, warfare and system centers and University Affiliated Research Centers/Federally Funded Research and Development Centers will support the Model Based Engineering, Technical Design, and Requirements branches in the new DW under OPNAV N2N6. In order to develop capability from the top down, the DW will develop requirements for the system of systems to include all of the associated interoperability requirements. Due to the complexity of this work, the DW will evolve the traditional requirements development methodology to a model based systems engineering environment that will include associated model extensions, reports, views, configuration management, help desk support, and documentation. This work will be completed by a series of teams, each focused on a separate threat domain, and made up of system modelers, fleet representatives, program of record representatives, architecture and interoperability experts, etc. The products generated by these teams will include data technical baselines for domain areas with individual profiles for each program of record, coordinated requirements recommendations, and potential areas for S&T and experimentation to fill gaps. The DW will also explore emerging digital technologies including human/machine teaming.

Each SYSCOM will be involved in creating Data Technical Baseline (DTB) profiles specific for each program of record. DTBs may consist of interfaces, protocols, content, information quality, architectural aspects, and knowledge base frameworks. SYSCOMs will exercise technical authority to assess Program of Record compliance to DTBs and Key Performance Parameters in support of gate reviews and system engineering technical reviews.

| **B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** |
|---|---|---|---|---|---|
| ***Title:*** SYSCOM/PEO DW Support | 0.000 | 4.400 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** The Digital Warfare (DW) will develop requirements, prioritize resources, and lead efforts on information interoperability and human/machine teaming in support of evolution to a digital Navy. NAVAIR, NAVSEA, SPAWAR, associated Program Executive Offices, warfare and system centers and university affiliated research centers (UARCs)/federally funded research and development centers (FFRDCs) will support the Model Based Engineering, Technical Design, and Requirements branches in the new DW under OPNAV N2N6. The work scope includes supporting development of a requirements modeling environment to include associated | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603582N / *Combat System Integration* | **Project (Number/Name)**<br>3425 / *Digital Warfare* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| model extensions, reports, views, configuration management, help desk support, and documentation; providing subject matter expert support for mission area model-based engineering teams; development of digital technical baselines for programs as well as associated baselines; exploration of emerging technologies including human/machine teaming; and developing and participating in workforce training in model-based systems engineering.<br><br>***FY 2018 Plans:***<br>Provide SME support for the domain functional decomposition for prioritized mission areas. Support the analytical agenda from OPNAV N81 and N9I for the specific mission area capabilities. Provide modeling and documentation support for JCIDS, OPNAV POM process, ASN (RD&A) Acquisition Process. Coordinate Program Executive Office (PEO) requirements allocation process.<br><br>Participate in the definition of MBSE tool functionality and views based on Echelon I stakeholder requirements. Collaboratively develop tool extensions to complement JCIDS and POM processes. Support development of cross-SYSCOM Modeling Standards and Policies for S&T and PoRs. Curate models in the modeling environment.<br><br>Provide subject matter export support for data science teams in the exploration of data analysis, information and knowledge extraction techniques and application to mission area requirements.<br>Provide engineering inputs to and review NICCs for data architecture consistencies. Explore Machine Learning techniques to support human/machine teaming for decision making.<br><br>Develop DTBs for PORs under SYSCOM cognizance. Assess DTBs for all SETR events and gate reviews.<br><br>Provide common infrastructure for MBSE and DTB environments, to include access management, configuration management, and help desk support.<br>***FY 2019 Base Plans:***<br>-Provide Subject Matter Expert (SME) support for the domain functional decomposition based on prioritized mission areas to include Anti-Submarine Warfare, Surface Warfare, Electronic Warfare and Air Warfare.<br>-Continue to establish and implement required extensions to model requirements trace and reports that will be used in the JCIDS process.<br>-Continue to validate current standards across the SYSCOMs to form the overarching Navy DTB in order to facilitate tailoring of each standard for the PoR DTB. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603582N / *Combat System Integration* | **Project (Number/Name)**<br>3425 / *Digital Warfare* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| -Continue to validate different SYSCOM architectures and guidance to produce a Navy-wide high level architectural framework.<br>-Continue to develop functional baseline architecture of Navy capabilities that maps back to mission threads.<br>-Tune configuration of, and cyber monitor, the distributed MBSE and data science prototype environment for remote accessibility over a given network enclave, including but not limited to NIPR, SIPR, and JWICS. Investigate cloud computing with respect to the modeling environment.<br>-Continue to integrate cyber requirements across all DW architecture and standard efforts and verify cyber requirements are captured as part of the modeling process.<br>-Continue to provide subject matter expert support for data science teams in the exploration of data analysis, information and knowledge extraction techniques and application to mission area requirements.<br>-Continue to participate in the definition of Model Based Systems Engineering (MBSE) tool functionality and views based on Echelon I stakeholder requirements. Collaboratively develop tool extensions to complement Joint Capabilities Integration and Development System (JCIDS) and Program Objective Memorandum (POM) processes.<br>-Curate models in the modeling environment and support development across Systems Commands (SYSCOMs) in Modeling Standards and Policies for Science and Technology (S&T) and Programs of Record (PoRs).<br>-Develop an overarching Data Technical Baseline (DTB) and DTB profiles for PoRs under SYSCOM cognizance. Assess PoRs against their DTB profile during all Systems Engineering Technical Review events and gate reviews.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Funding decreased due Proj 3425 Digital Warfare (DW) MBE&DT Development moved to new RDT&EN PE 0603017N. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 4.400 | 0.000 | 0.000 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603582N / *Combat System Integration* | **Project (Number/Name)**<br>3425 / *Digital Warfare* |

**E. Performance Metrics**

TBD

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603582N / *Combat System Integration* | Project (Number/Name)<br>3425 / *Digital Warfare* | |

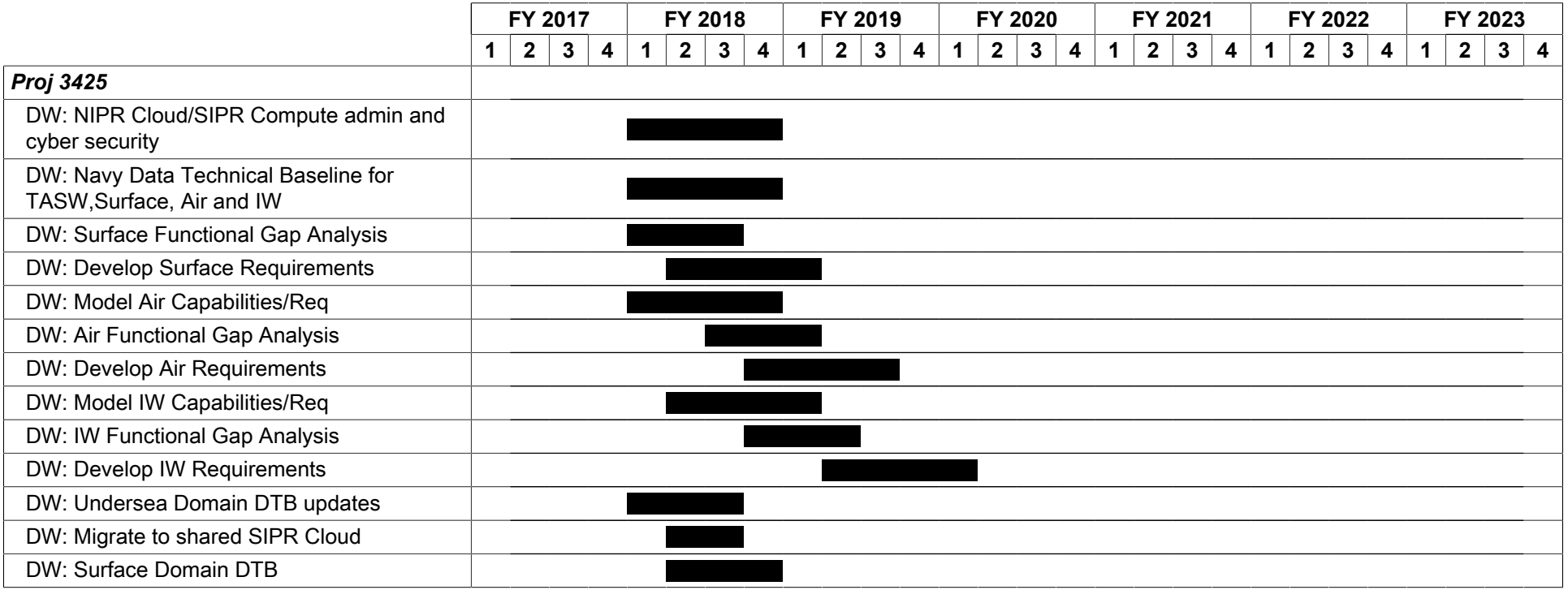
**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DW | WR | NSWCs : Various | 0.000 | 0.000 | | 1.700 | Dec 2017 | 0.000 | Dec 2018 | - | | 0.000 | 0.000 | 1.700 | - |
| DW | WR | NUWC : Keport | 0.000 | 0.000 | | 1.480 | Dec 2017 | 0.000 | Dec 2018 | - | | 0.000 | 0.000 | 1.480 | - |
| DW | C/CPFF | Various : Various | 0.000 | 0.000 | | 1.220 | Dec 2017 | 0.000 | Dec 2018 | - | | 0.000 | 0.000 | 1.220 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 4.400 | | 0.000 | | - | | 0.000 | 0.000 | 4.400 | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 4.400 | | 0.000 | | - | | 0.000 | 0.000 | 4.400 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603582N / *Combat System Integration* | **Project (Number/Name)**<br>3425 / *Digital Warfare* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603582N / *Combat System Integration* | **Project (Number/Name)**<br>3425 / *Digital Warfare* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3425*** | | | | |
| DW: NIPR Cloud/SIPR Compute admin and cyber security | 1 | 2018 | 4 | 2018 |
| DW: Navy Data Technical Baseline for TASW,Surface, Air and IW | 1 | 2018 | 4 | 2018 |
| DW: Surface Functional Gap Analysis | 1 | 2018 | 3 | 2018 |
| DW: Develop Surface Requirements | 2 | 2018 | 1 | 2019 |
| DW: Model Air Capabilities/Req | 1 | 2018 | 4 | 2018 |
| DW: Air Functional Gap Analysis | 3 | 2018 | 1 | 2019 |
| DW: Develop Air Requirements | 4 | 2018 | 3 | 2019 |
| DW: Model IW Capabilities/Req | 2 | 2018 | 1 | 2019 |
| DW: IW Functional Gap Analysis | 4 | 2018 | 2 | 2019 |
| DW: Develop IW Requirements | 2 | 2019 | 1 | 2020 |
| DW: Undersea Domain DTB updates | 1 | 2018 | 3 | 2018 |
| DW: Migrate to shared SIPR Cloud | 2 | 2018 | 3 | 2018 |
| DW: Surface Domain DTB | 2 | 2018 | 4 | 2018 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603595N *I SSBN New Design* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 1,744.587 | 681.164 | 776.158 | 514.846 | - | 514.846 | 433.296 | 313.445 | 196.082 | 173.611 | Continuing | Continuing |
| 3220: *COLUMBIA Class Submarine Development* | 1,744.587 | 681.164 | 776.158 | 514.846 | - | 514.846 | 433.296 | 313.445 | 196.082 | 173.611 | Continuing | Continuing |

**Program MDAP/MAIS Code:**
**Project MDAP/MAIS Code(s):** P444

**A. Mission Description and Budget Item Justification**

The FY 2019 funding request was reduced by $0.046 million to reflect the Department of the Navy's effort to support the Office of Management and Budget directed reforms for Efficiency and Effectiveness that include a lean, accountable, more efficient government.

This program element supports innovative research and development in submarine Hull, Mechanical and Electrical (HM&E) and combat systems technologies and the subsequent evaluation, demonstration, and validation for submarine platforms. It will increase the submarine technology base and provide subsystem design options not currently feasible. The program element also supports programs transitioning from Science and Technology (S&T), Defense Advanced Research Projects Agency (DARPA), Independent Research and Development, and Small Business Innovation Research (SBIR) projects.

Project Unit 3220:

The objective of the SSBN New Design project is to design and prepare for construction of the replacement of the OHIO Class SSBN.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 700.811 | 776.158 | 514.520 | - | 514.520 |
| Current President's Budget | 681.164 | 776.158 | 514.846 | - | 514.846 |
| Total Adjustments | -19.647 | 0.000 | 0.326 | - | 0.326 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -19.647 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | 7.831 | - | 7.831 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -7.505 | - | -7.505 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603595N / *SSBN New Design* | Project (Number/Name)<br>3220 / *COLUMBIA Class Submarine Development* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3220: *COLUMBIA Class Submarine Development* | 1,744.587 | 681.164 | 776.158 | 514.846 | - | 514.846 | 433.296 | 313.445 | 196.082 | 173.611 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Project MDAP/MAIS Code:** P444

**A. Mission Description and Budget Item Justification**

The COLUMBIA Submarine Class Program (previously the OHIO Replacement Class) is developing the next generation sea-based strategic deterrent. The funding applies to the design, systems engineering, prototyping, and vendor qualification activities needed to execute the schedule for Common Missile Compartment (CMC) design, whole ship design, and component technologies development for the next generation U.S. ballistic missile submarine (SSBN). This RDT&E program supports cooperation with the United Kingdom (UK) to maintain strategic deterrence, based on a single effort to develop a CMC as agreed by the UK Secretary of State for Defense and the U.S. Secretary of Defense in 2009.
The COLUMBIA program strategy is to leverage the re-use of existing Submarine systems (as applicable), focus on Life Cycle Total Ownership Cost (TOC) affordability, and meet the military requirements established for this SSBN to achieve mission success in a challenging environment. The requested funding levels provide for the Technology Development, Design, Engineering, and Integration efforts necessary to support the COLUMBIA Class SSBN lead ship construction start in FY 2021.

The following key activities support a ship acquisition program to replace the OHIO Class SSBNs:
1. Design and development of a missile compartment, launch system, and Strategic Weapons Support Systems (SWSS) to meet U.S. strategic requirements while cooperating with the UK on modernizing its strategic deterrent in accordance with Presidential direction (December 2006).
2. Concept Definition, System Definition, and Detailed Design for remaining portions of the ship will be accomplished through a Design/Build/Sustain approach modeled after the approach used by the VIRGINIA Class program.
3. Engineering and integration of existing technologies and development of new technologies required to provide the capabilities necessary to ensure platform operational effectiveness and minimize life cycle cost.

COLUMBIA Class SSBN Concept Study, System Definition Prototyping, and Technology Development Efforts support design, systems engineering, component development and vendor qualification activities needed to develop the CMC design and the COLUMBIA whole ship design. The COLUMBIA design timelines are based on a design approach proven on the VIRGINIA Class Program, adjusted for the additional complexity of a missile compartment and Strategic Weapons Systems (SWS). Planned technical studies and prototyping are necessary to reduce risks associated with updating SSBN system designs for current technical standards and demonstrating design feasibility of developmental technology to meet the ship design and construction schedule.

The Navy continues to invest in program funded affordability initiatives similar to those employed successfully for VIRGINIA Class, but tailored to the unique SSBN mission and operational tempo of COLUMBIA Class to drive down overall program costs. Efforts focus on reducing ship construction costs through implementing

more effective design features and fabrication and assembly methods for a more affordable submarine. As part of this effort, alternative procurement and contracting strategies are also being examined to include Multi-Program Material Procurement (MPMP) and Economic Order Quantity (EOQ).

FY17 activities were executed to ensure the first article quad pack (FAQP) prototype of the CMC remains on schedule to support the UK DREADNOUGHT Program and to continue validation of the Integrated Tube and Hull (ITH) build strategy. These activities included the start of construction for the FAQP in August 2016 with a planned completion in 2019. The CMC program will mature required technologies and re-host the TRIDENT II D5 SWS (Launcher, Fire Control and Navigation) while ensuring no degradation to D5 security, safety, and performance. In addition, whole ship design efforts are focused on technologies requiring significant engineering, integration, and development time as well as those technologies that are required to support ship design and construction schedules such as the propulsor and maneuvering/ ship control. These technologies are critical for stealth capability for a ship class that will be in service until the 2080s. Ship detailed design efforts include important pre-construction activities such as finalizing ship arrangements, development of design disclosures to support build products,, risk characterization, and mitigation, improvement and validation of performance prediction tools and improvement of design tools. Technology development will address engineering and integration of existing technologies as well as maturation of developmental technologies.
On 14 December 2016, the Secretary of the Navy announced the lead ship of the OHIO Replacement Program will be USS COLUMBIA (SSBN 826) which officially designates this program the COLUMBIA Class Submarine Program.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Common Missile Compartment Design and Prototyping | 231.057 | 256.968 | 183.413 | 0.000 | 183.413 |
| ***Articles:*** | - | - | - | - | - |

***FY 2018 Plans:***
The combination of CMC Design and Prototyping and Ship Study and Design represents the required LDY Shipbuilder effort for the COLUMBIA Program.

CMC Design and Prototyping: This funding applies to the design, systems engineering, prototyping, and vendor qualification activities needed to execute the schedule for CMC design and component / technology development for the COLUMBIA submarine. Included in this effort is continued development of CMC design and logistics products. Specific planned efforts in FY 2018 include the completion of all remaining CMC arrangements (1045 products) approximately 20% of logistics products, approximately 85 percent of CMC Design Disclosures (850 design disclosures) in support of the MTM build. Specific planned efforts for 2018 also include: continued fabrication, delivery, and outfitting of MTs; continued manufacturing of the FAQP and continued support of development of SWSS for the land based test facility, SWS Ashore (SWSA).

Ship Study and Design: This funding applies to the shipbuilder design, systems engineering, prototyping, and vendor qualification activities needed to execute the schedule for whole ship design, component / technology development for the COLUMBIA submarine. Specific efforts in FY 2018 include the completion of 90 percent of

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| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| total Arrangements (approximately 3800 arrangement disclosures including CMC arrangements), 35 percent of total Design Disclosures (approximately 1597 design disclosures including CMC design disclosures), and 7 percent of logistics technical documentation, and supportability assessments. Efforts will also continue towards maintaining configuration control for all CMC interfaces with RoS and progressing ship integration of the Propulsor design.<br>***FY 2019 Base Plans:***<br>The combination of CMC Design and Prototyping with Whole Ship Study and Design represents the required LDY Shipbuilder effort for the COLUMBIA Program.<br><br>CMC Design and Prototyping: This funding applies to the design, systems engineering, prototyping, and vendor qualification activities needed to execute the schedule for CMC design and component / technology development for the COLUMBIA submarine. Included in this effort is continued development of CMC design products. Specific planned efforts in FY 2019 include the completion of approximately 40 percent of logistic products and 97 percent of CMC Design Disclosures (964 design disclosures) in support of the MTM build. Specific planned efforts for 2019 also include: continued fabrication of MTs; completion of manufacturing of the FAQP and manufacturing in support of the Missile Tube Module, and continued development of SWSS for the land based test facility, SWSA.<br><br>Whole Ship Study and Design: This funding applies to the shipbuilder design, systems engineering, prototyping, and vendor qualification activities needed to execute the schedule for whole ship design and component / technology development for the COLUMBIA submarine. Specific efforts in FY 2019 include the completion of 97 percent of total Arrangements (approximately 4104 arrangement disclosures including CMC arrangement), 60 percent of total Design Disclosures (approximately 2735 design disclosures including CMC design disclosures) , 12 percent of logistics technical documentation, and supportability assessments. Efforts will also continue towards maintaining configuration control for all CMC interfaces with Rest of Ship and progressing ship integration of the Propulsor design.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Overall efforts transitioning to SCN Detailed Design and construction efforts | | | | | |
| ***Title:*** NAVSEA R&D and Prototyping | 189.618 | 276.681 | 155.860 | 0.000 | 155.860 |

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| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>This funding applies to the Government combat systems, component and technology development for the COLUMBIA submarine essential to achieving required signatures, maneuverability, combat and communications capabilities. Efforts in FY 2018 will include: completing hardware manufacturing for VLTA and Large Scale Vehicle (LSV) testing, and testing of Generation 2 propulsor designs on the VLTA in water tunnels and on the LSV at the Acoustic Research Detachment. The COLUMBIA Program will complete installation and begin testing and calibration of an array upgrade to support Generation 2 propulsor large scale vehicle testing, and will continue testing on the full scale bearing test facility (FSBTF). Preliminary hydrodynamic characterization and submerged operating envelope development will begin as well as completion of bow dome attachment qualification tests and continued development of detailed designs for the COLUMBIA sonar bow dome. In addition, continued efforts for: development, refinement, and delivery of GFI for NPES, stowage arrangements to support these systems, support arrangement and design disclosure progress, continued development and assessment of AN/BRR-6 reliability based updates, and continued systems architecture assessment and development in conjunction with existing submarine classes to achieve and deliver common combat system architecture across existing submarine classes. Finally this effort will continue Government support and oversight of development of approximately 98 engineered components, begin diesel generator qualification testing, complete fabrication of qualification ACRU and begin qualification testing. CMC will continue preparations for construction of the missile tube module leveraging lessons from FAQP prototype. | | | | | |
| ***FY 2019 Base Plans:***<br>This funding applies to the Government combat systems, component and technology development for the COLUMBIA submarine essential to achieving required signatures, maneuverability, combat and communications capabilities. Efforts planned in FY 2019 include:<br>Combat Systems: Continue refinement and updates to GFI to support detailed design, production, and manufacturing integration, continued assessment of AN/BRR-6 reliability based updates, including land based system development and test, and early environmental qualification testing of Government Furnished Equipment supporting Columbia technical insertion.<br><br>Component Development: Continue Government support and oversight of development of over 98 engineered components, deliver prototype diesel generator to compatibility test facility for integration testing, complete ACRU qualification testing and restoration, submit ACRU OPALT package for approval, award contract for lead | | | | | |

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| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ship ACRU procurement, and continue operation of prototype ACRU at NSWC Philadelphia to gather reliability and performance data.<br>Propulsor and Shafting: Complete full scale mechanical propulsor designs, complete generation 2 propulsor LSV testing, complete final rotor hydrodynamic design, down-select design for fixed portion of propulsor, test candidate COLUMBIA Class propulsor bearing liner materials at the FSBTF, and begin reconfiguring the FSBTF for COLUMBIA propulsor bearing testing.<br><br>Shock, Structures and Composites: Continue fabrication of combined shock and submergence scale models, complete fabrication of the forward pressure hull confirmation model, continue forward pressure hull need to repair procedures, continue out-of-autoclave bow dome fabrication, and begin navigation sonar system window fabrication.<br><br>Signatures: evaluate data from PIKE model testing with stern section.<br><br>Maneuvering, Ship Control and Hydrodynamic: Deliver steering and diving, assisted ballast and trim, and anomaly detector algorithms to shipbuilder for incorporation into ship control software.<br><br>Modular Construction Prototyping: continue construction of the prototype FAQP and validation of the ITH manufacturing technique as well as applying modular construction techniques to be further applied to the entire MTM. Additionally, this effort includes manufacture of the remaining lead ship COLUMBIA missile tubes that will be incorporated into the prototype MTM.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Overall efforts transitioning to SCN Detailed Design and construction efforts | | | | | |
| ***Title:*** Systems Engineering/Program Management | 55.750 | 57.279 | 56.383 | 0.000 | 56.383 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>This funding applies to the Government oversight, including Program Office management and technical support from government laboratories, for review, analysis and approval of lead design yard and various government performers' design deliverables. Specific efforts in FY 2018 will include logistics life cycle development, | | | | | |

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| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| integration of supportability assessment information, identification and assessment of platform, shore facilities and infrastructure requirements; development of maintenance and repair standards; and higher fidelity functional mapping of CDD requirements to key subordinate design documents such as the NPES Functional Requirements Document (FRD) and Ship Building Specifications in support of both the planned System Engineering Technical Review (SETR) events and platform arrangements reviews and staffing of other design deliverables from the LDY and Participating Acquisition Resource Managers (PARM). Tabletop platform cyber risk assessments, including deep dives into mission essential systems, will continue. Conclude OT-B1 and provide a test report to Director Operational Test and Evaluation regarding risk to successful resolution of the critical operational issues identified in the TEMP. Planned LFT&E activities include procurement of Sonar components in synchronization with the PARM's procurement action to support of planned Commercial Off The Shelf (COTS) equipment fragility testing in FY20 and calibration testing of the test bed; and conduct High Capacity Mount/Damper testing to characterize the shock environment of COLUMBIA Class shock-isolated decks. Complete the first COLUMBIA Class Survivability Assessment Report (SAR) Cyber Developmental and Operational Test (DT/OT) events will be planned and conducted. The maturation of the OT-B1 COLUMBIA Survivability M&S baseline will continue, taking leverage from relevant at sea data collected by other programs and the Fleet so as to reduce the need for COLUMBIA first of class sea testing. Complete IWG efforts with final development and acceptance of integration risks and associated mitigations. | | | | | |
| ***FY 2019 Base Plans:***<br>The Program will conduct a Construction Request for Proposal (RFP) Defense Acquisition Board in the first half of the year and a Critical Design Review (CDR) in the second half of FY 2019. The TEMP will be updated as will the LFT&E Management Plan. The final increment of NPES COTS (Imaging and Combat System components) will be procured in support of FY 2020 COTS fragility testing at Naval Surface Warfare Center Philadelphia. Survivability M&S maturation will continue at NUWC with the objective of assuring that the suite will support accreditation by COMOPTEVFOR before Initial Operational Test and Evaluation in FY2028. The COLUMBIA Class Program Office will continue to report on results of developmental testing conducted to DASD(DT&E) in accordance with the TEMP. Additional significant 2019 milestones will include: Cyber Risk assessments to support continual cyber security development, early Strategic Program System Integration into NPES Systems, and Development of Columbia Electronics Integration Plan to support shore side Command and Control integration and test, and execution of integration risk mitigations as identified by the IWG. | | | | | |
| ***FY 2019 OCO Plans:*** | | | | | |

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| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Minimal decrease from FY18 to FY19 due to rate changes. | | | | | |
| ***Title:*** Strategic Weapons Systems Integration | 204.739 | 185.230 | 119.190 | 0.000 | 119.190 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Continuing system engineering efforts required for the re-hosting and integration of the TRIDENT II (D5) SWS on the COLUMBIA submarine including review and modification of SWS Coordination, Interface and Arrangement Drawings for SWS equipment within the CMC and performing associated Logistic Support activities. The COLUMBIA program will also complete launcher evaluation testing at the LTF. The COLUMBIA program will continue: SWS Test Systems material procurement and builds and complete remaining land-based test berth / facility modifications. Continue development of special test vehicles; SWS Ashore test capability development; SWS training capability/requirements development. Continue systems engineering design related to the COLUMBIA guidance handling cart and procurement of a prototype guidance handling cart. The COLUMBIA CLASS program will also continue detailed design efforts required to conduct SWS Launcher, Fire Control, Navigation and Reentry System-level Critical Design Reviews. Commence Reentry Body Simulator material procurement and build. | | | | | |
| ***FY 2019 Base Plans:***<br>Continuing system engineering efforts required for the re-hosting and integration of the TRIDENT II (D5) SWS on the COLUMBIA submarine including review and modification of SWS Coordination, Interface and Arrangement Drawings for SWS equipment within the CMC and performing associated Logistic Support activities. The COLUMBIA program will also commence qualification launches at the LTF. The COLUMBIA program will continue SWS Test Systems material procurement and builds, development of special test vehicles, and SWS Ashore test capability development. Continue SWS training capability/requirements development and conduct a SWS Training System Critical Design Review involving both the SWS Fire Control and Navigation subsystems. Continue systems engineering design related to the COLUMBIA guidance handling cart and commence a Safety Assessment Review. The COLUMBIA program will commence utilization of the SWS Fire Control Engineering Test System within the land-based test berth and deliver a Guidance Handling Cart prototype. The COLUMBIA program also will conduct Production Readiness Reviews for SWS Fire Control and Navigation subsystems. | | | | | |

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| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Continue Reentry Body Simulator production. Additional plans include continuing efforts of the Integration Working Group to execute early integration of NPES with strategic weapon systems.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Overall efforts transitioning to Detailed Design and construction efforts | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 681.164 | 776.158 | 514.846 | 0.000 | 514.846 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • RDTEN/0603570N/3219: *SBSD Nuclear Technology Development* | 390.326 | 265.462 | 190.100 | - | 190.100 | 114.006 | 80.085 | 60.142 | 56.841 | Continuing | Continuing |
| • RDTEN/0101221N/0951: *Joint Warhead Fuze Sustainment Program* | 111.857 | 109.730 | 62.203 | - | 62.203 | 28.820 | 21.777 | 0.000 | 0.000 | 0.000 | 726.644 |
| • OPN/5358: *Strategic Missile Systems Equip* | 215.138 | 246.221 | 271.817 | - | 271.817 | 274.440 | 241.396 | 254.053 | 259.020 | Continuing | Continuing |
| • WPN/1250: *TRIDENT II Mods* | 1,099.086 | 1,143.595 | 1,078.750 | - | 1,078.750 | 1,178.210 | 1,217.078 | 1,205.587 | 1,308.930 | 3,215.106 | 24,862.561 |
| • OMN/1D2D: *Fleet Ballistic Missile* | 1,241.095 | 1,278.456 | 1,361.947 | - | 1,361.947 | 1,379.668 | 1,397.882 | 1,432.037 | 1,460.413 | Continuing | Continuing |
| • SCN/1045: *COLUMBIA Class Submarine* | 773.138 | 842.853 | 3,005.330 | - | 3,005.330 | 1,453.159 | 4,214.573 | 4,198.025 | 3,875.888 | 90,686.558 | 109,049.524 |
| • MCN/32414106: *Submarine Propulsor Manufacturing Support Facility* | 0.000 | 0.000 | 71.050 | - | 71.050 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 71.050 |

**Remarks**

**D. Acquisition Strategy**

The Common Missile Compartment (CMC) will be designed and developed to support the U.S. and UK in development of the COLUMBIA and DREADNOUGHT SSBN programs enabling a common U.S.-UK CMC and maximizing the benefit of the ongoing U.S.-UK partnership in strategic deterrence. The COLUMBIA Class Program

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R&D efforts will incentivize cost reduction initiatives in the design, construction and operations & support portions of the program. R&D efforts will be performed by Navy laboratories, shipyards, private industry, and University Affiliated Research Centers.

**E. Performance Metrics**

Updated Integrated Master Schedule and CMC build strategy down-select. Development of signature management efforts to address knowledge gap, concepts for propulsor and shafting, and design guidance and interface control requirements.

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**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Product Development | SS/CPFF | Ship Design Contractor-EB : Groton, CT | 942.360 | 231.057 | Oct 2016 | 256.968 | Oct 2017 | 183.413 | Oct 2018 | - | | 183.413 | Continuing | Continuing | Continuing |
| Product Development | WR | NSWC : Carderock, MD | 298.547 | 89.804 | Oct 2016 | 105.462 | Oct 2017 | 58.307 | Oct 2018 | - | | 58.307 | Continuing | Continuing | Continuing |
| Product Development | WR | NSWC : Philadelphia, PA | 0.000 | 27.142 | Oct 2016 | 31.791 | Oct 2017 | 17.695 | Oct 2018 | - | | 17.695 | 0.000 | 76.628 | - |
| Product Development | WR | NUWC : Newport, RI | 35.853 | 19.970 | Oct 2016 | 23.270 | Oct 2017 | 12.951 | Oct 2018 | - | | 12.951 | Continuing | Continuing | Continuing |
| Product Development | Various | NAVSEA : Various | 47.218 | 52.702 | Oct 2016 | 116.159 | Oct 2017 | 66.907 | Oct 2018 | - | | 66.907 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | ARL Penn State University : State College, PA | 0.984 | 0.377 | Oct 2016 | 0.900 | Oct 2017 | 0.931 | Oct 2018 | - | | 0.931 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | NGMS : Sunnyvale, CA | 87.324 | 46.912 | Oct 2016 | 35.183 | Oct 2017 | 17.040 | Oct 2018 | - | | 17.040 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | JHU/APL : Laurel, MD | 8.396 | 6.102 | Oct 2016 | 5.542 | Jan 2018 | 6.230 | Jan 2019 | - | | 6.230 | Continuing | Continuing | Continuing |
| Product Development | WR | NUWC : Keyport, WA | 0.000 | 0.652 | Oct 2016 | 0.480 | Oct 2017 | 0.372 | Oct 2018 | - | | 0.372 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | CSDL : Cambridge, MA | 6.596 | 2.485 | Oct 2016 | 0.794 | Oct 2017 | 0.370 | Oct 2018 | - | | 0.370 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | LMRMS : Mitchel Field, NY | 27.654 | 22.153 | Oct 2016 | 21.899 | Dec 2017 | 14.446 | Oct 2018 | - | | 14.446 | Continuing | Continuing | Continuing |
| Product Development | C/CPFF | EMCUBE : Alexandria, VA | 1.666 | 0.693 | Oct 2016 | 1.157 | Oct 2017 | 1.158 | Oct 2018 | - | | 1.158 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | LMMSC : Sunnyvale, CA | 52.288 | 22.962 | Apr 2017 | 20.986 | Oct 2017 | 13.462 | Feb 2019 | - | | 13.462 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | JRC : Washington, DC | 1.663 | 1.333 | Oct 2016 | 3.337 | Oct 2017 | 3.387 | Oct 2018 | - | | 3.387 | Continuing | Continuing | Continuing |
| Product Development | C/CPFF | GDMS : Pittsfield, MA | 54.852 | 39.481 | Oct 2016 | 34.057 | Nov 2017 | 12.600 | Nov 2018 | - | | 12.600 | Continuing | Continuing | Continuing |
| Product Development | WR | CNSW : China Lake, CA | 24.595 | 25.134 | Oct 2016 | 19.008 | Nov 2017 | 15.972 | Nov 2018 | - | | 15.972 | Continuing | Continuing | Continuing |

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**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Product Development | SS/CPFF | IEC : Anaheim, CA | 2.159 | 0.710 | Oct 2016 | 0.539 | Oct 2017 | 0.505 | Oct 2018 | - | | 0.505 | Continuing | Continuing | Continuing |
| Product Development | WR | NSWC : Dahlgren, VA | 7.154 | 5.981 | Oct 2016 | 8.059 | Oct 2017 | 7.244 | Oct 2018 | - | | 7.244 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | BAE : Rockville, MD | 17.724 | 10.091 | Oct 2016 | 8.397 | Oct 2017 | 6.674 | Oct 2018 | - | | 6.674 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | BNA : Huntington Beach, CA | 1.768 | 1.449 | Oct 2016 | 0.000 | Oct 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Product Development | WR | NSWC Crane : Crane, IN | 30.357 | 13.715 | Oct 2016 | 8.960 | Nov 2017 | 8.204 | Nov 2018 | - | | 8.204 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | GDEB : Groton, CT | 0.000 | 0.000 | | 5.830 | Oct 2017 | 4.804 | Oct 2018 | - | | 4.804 | 0.000 | 10.634 | - |
| Product Development | Various | SSP : Various | 9.536 | 2.032 | Oct 2016 | 8.096 | Oct 2017 | 4.085 | Oct 2018 | - | | 4.085 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | SPA : Alexandria, VA | 5.655 | 2.477 | Oct 2016 | 2.006 | Oct 2017 | 1.706 | Oct 2018 | - | | 1.706 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 1,664.349 | 625.414 | | 718.880 | | 458.463 | | - | | 458.463 | Continuing | Continuing | N/A |

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Contractor Management Support | C/CPFF | Various : Multiple Awards | 41.863 | 30.304 | Oct 2016 | 30.758 | Nov 2017 | 29.463 | Nov 2018 | - | | 29.463 | Continuing | Continuing | Continuing |
| Government Management Support | WR | Various: NSWC : Carderock, MD | 37.509 | 14.815 | Oct 2016 | 15.725 | Oct 2017 | 15.959 | Oct 2018 | - | | 15.959 | Continuing | Continuing | Continuing |
| Government Management Support | WR | Various: NSWC : Philadelphia, PA | 0.000 | 3.240 | Oct 2016 | 3.289 | Oct 2017 | 3.338 | Oct 2018 | - | | 3.338 | 0.000 | 9.867 | - |
| Government Management Support | WR | Various: NUWC : Newport, RI | 0.000 | 5.034 | Oct 2016 | 5.109 | Oct 2017 | 5.186 | Oct 2018 | - | | 5.186 | 0.000 | 15.329 | - |
| Government Management Support | WR | Vairous: SUPSHIP : Groton, CT | 0.000 | 1.744 | Oct 2016 | 1.770 | Oct 2017 | 1.797 | Oct 2018 | - | | 1.797 | 0.000 | 5.311 | - |
| Travel | WR | NAVSEA HQ : Washington, D.C. | 0.866 | 0.613 | Nov 2016 | 0.627 | Nov 2017 | 0.640 | Nov 2018 | - | | 0.640 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 80.238 | 55.750 | | 57.278 | | 56.383 | | - | | 56.383 | Continuing | Continuing | N/A |

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**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

**Remarks**

The program analyzed the Management Services which were originally planned in SCN beginning in FY17, and determined it was more appropriately funded with R&D through lead ship construction start in FY21. This submission reflects those changes for FY17, FY18 and FY19.

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 1,744.587 | 681.164 | | 776.158 | | 514.846 | | - | | 514.846 | Continuing | Continuing | N/A |

**Remarks**

The listed Award Dates represent the date on which initial obligations occur for the effort.

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
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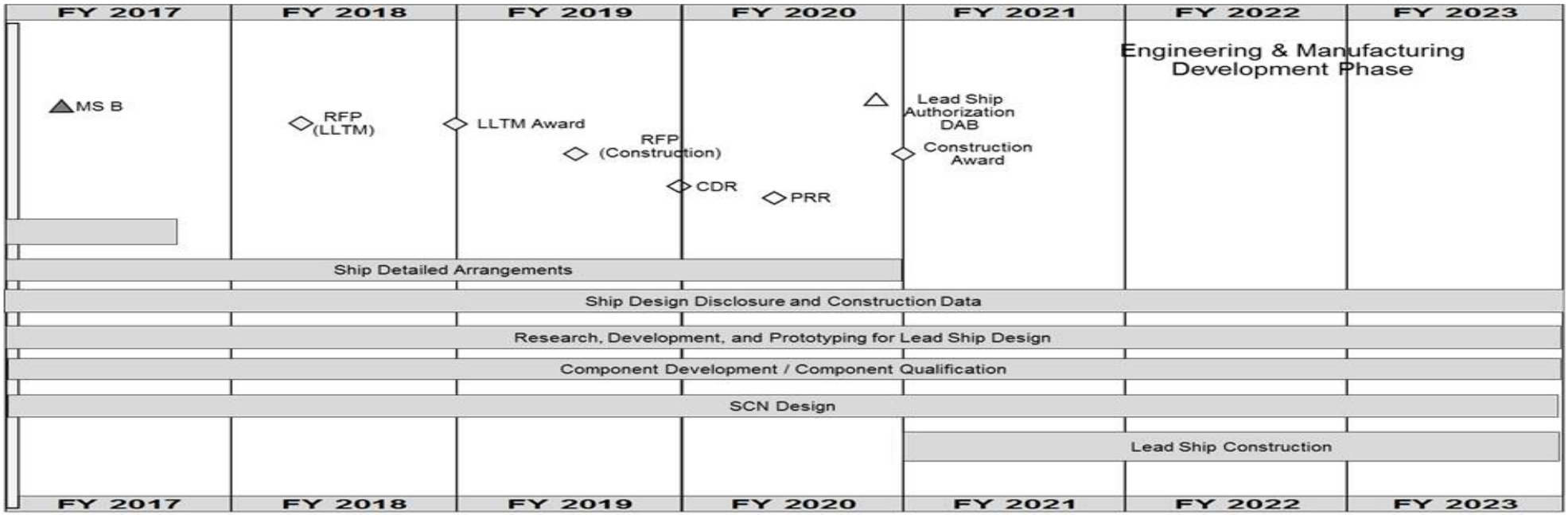


CDD - Capabilities Development Document
CDR - Critical Design Review
CPD - Capability Production Document
DAB - Defense Acquisition Board
IPR - In Progress Review
JROC - Joint Requirements Oversight Council
LLTM - Long Lead Time Material
MS - Milestone
PDR - Preliminary Design Review
PRR – Production Readiness Review
RDT&E - Research, Development, Test, & Evaluation
RFP - Request for Proposal
SCN - Shipbuilding and Conversion, Navy
SRR - System Requirements Review

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603595N / *SSBN New Design* | **Project (Number/Name)**<br>3220 / *COLUMBIA Class Submarine Development* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Notes: * Effort began prior to 1st Quarter FY 2017. ** Effort continues past 4th Quarter FY 2023*** | | | | |
| System Descriptions and Rev A Diagrams* | 1 | 2017 | 3 | 2017 |
| Ship Detailed Arrangements* | 1 | 2017 | 4 | 2019 |
| Ship Design Disclosure and Construction Data*, ** | 1 | 2017 | 3 | 2023 |
| Research, Development, and Prototyping for Lead Ship*, ** | 1 | 2017 | 4 | 2023 |
| Component Development/Component Qualification* , ** | 1 | 2017 | 4 | 2023 |
| SCN Design** | 1 | 2017 | 4 | 2023 |
| Lead Ship Construction** | 1 | 2021 | 4 | 2023 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603596N *I (U)LCS Mission Modules* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 371.619 | 153.595 | 116.871 | 103.633 | - | 103.633 | 70.548 | 45.057 | 46.016 | 28.703 | Continuing | Continuing |
| 2550: *Mine Countermeasure (MCM) Mission Package* | 0.000 | 0.000 | 0.000 | 41.813 | - | 41.813 | 39.499 | 26.419 | 27.878 | 10.793 | Continuing | Continuing |
| 2551: *Anti-Submarine Warfare (ASW) Mission Package* | 0.000 | 0.000 | 0.000 | 41.553 | - | 41.553 | 19.180 | 9.282 | 8.884 | 8.500 | Continuing | Continuing |
| 2552: *Surface Warfare (SUW) Mission Package* | 0.000 | 0.000 | 0.000 | 11.368 | - | 11.368 | 1.558 | 0.000 | 0.000 | 0.000 | 0.000 | 12.926 |
| 3129: *LCS Mission Package Development* | 371.619 | 153.595 | 116.871 | 8.899 | - | 8.899 | 10.311 | 9.356 | 9.254 | 9.410 | Continuing | Continuing |
| **Program MDAP/MAIS Code:**<br>**Project MDAP/MAIS Code(s):** 443 | | | | | | | | | | | | |

**A. Mission Description and Budget Item Justification**

The FY 2019 funding request was reduced by $0.224 million to reflect the Department of Navy's effort to support the Office of Management and Budget directed reforms for Efficiency and Effectiveness that include a lean, accountable, more efficient government.

This Program Element (PE) provides funds for detailed design, development, issue resolution, certification, integration, and testing of the Littoral Combat Ship (LCS) Mission Modules (MM). LCS is a fast, agile, and networked surface combatant with capabilities optimized to defeat asymmetric threats, and ensure naval and joint force access into contested littoral regions. It uses open-systems architecture design, modular weapons, sensor systems, and a variety of manned and unmanned vehicles to expand the battle space and project offensive power into the littoral.

The LCS MM Program is utilizing an incremental development approach to deliver capability, which allows the continued insertion of mature capabilities throughout the life of the program without the need for modifications to the sea frames. Future capabilities will be considered when joint warfighting objectives or changing threats create new operational capability requirements that cannot be met by current mission package designs, or when new technological opportunities allow significant progress toward delivering cost effective, enhanced capabilities. Future mission module increments can be tested, constructed, and incorporated into existing mission packages, one of the most important benefits of LCS modular design.

Beginning in FY 2019, Mission Package funding is realigned into four (4) projects:
2550 Mine Countermeasures (MCM) Mission Package
2551 Anti-Submarine Warfare (ASW) Mission Package
2552 Surface Warfare (SUW) Mission Package
3129 LCS Mission Package Development

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603596N *I (U)LCS Mission Modules* |

Prior to FY 2019 all Mission Package funding was in project 3129.

MCM MP: Counters bottom, tethered, near surface, and surface mines in the littorals without putting sailors in the minefield.

SUW MP: Increases firepower and offensive/defensive capabilities against large numbers of highly maneuverable, fast, small craft threats, giving LCS the ability to protect the sea lanes and move a force quickly through a choke point or other strategic waterway, and to conduct maritime security missions.

ASW MP: Enables the LCS to conduct detect-to-engage operations against modern submarines that pose a threat.

C5I: Once mission package specific RDT&E funding was split out from the LCS Mission Package Development project element 3129, the remaining funds provide the enabling products required by all MPs such as common hardware interfaces, computer operating environment (Mission Package Computing Environment (MPCE)), communications systems (Multi-Vehicle Communications System (MVCS)), aviation interface systems, and Mission Package Portable Control Stations (MPPCS). The MPCE provides common services and an Operating Environment to support all Mission Package Application Software and Open Architecture Products. The MVCS enables the simultaneous control and data exchange between unmanned mission vehicles and the Ship. Aviation interface systems include integration and management of data communications, data processing, and physical hardware interfaces such as common equipment and containers used by all mission packages. The MPPCS provides a mobile operating environment installed in a 20ft ISO container and serves as a surrogate Ship during mission package development and integration test events at test ranges.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 160.058 | 116.871 | 78.302 | - | 78.302 |
| Current President's Budget | 153.595 | 116.871 | 103.633 | - | 103.633 |
| Total Adjustments | -6.463 | 0.000 | 25.331 | - | 25.331 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | - | - | | | |
| • Program Adjustments | 0.000 | 0.000 | 26.976 | - | 26.976 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -1.645 | - | -1.645 |
| • Congressional General Reductions Adjustments | -0.013 | - | - | - | - |
| • Congressional Directed Reductions Adjustments | -6.450 | - | - | - | - |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603596N *I (U)LCS Mission Modules* |

**Change Summary Explanation**

Beginning in FY 2019, Mission Package funding is realigned into four (4) projects:

2550 Mine Countermeasures (MCM) Mission Package
2551 Anti-Submarine Warfare (ASW) Mission Package
2552 Surface Warfare (SUW) Mission Package
3129 LCS Mission Package Development

Prior to FY 2019 all mission package funding was in project 3129.

The increase in FY 2019 addresses MCM shortfalls and supports stand up of the LCS MCM divisions to minimize service life extensions to both MCM-1 ships and the MH-53E Helicopters. Specifically, this increase funds the completion of MCM USV integration into the MCM MP to support formal developmental testing in FY 2019 / FY 2020, operational testing in FY 2020, and MCM MP Initial Operational Capability in FY 2021.

Additionally, the increase in FY19 supports ASW mission package integration on Independence variant and initiation of the ASW ACB/TI process.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603596N / *(U)LCS Mission Modules* | Project (Number/Name)<br>2550 / *Mine Countermeasure (MCM) Mission Package* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2550: *Mine Countermeasure (MCM) Mission Package* | 0.000 | 0.000 | 0.000 | 41.813 | - | 41.813 | 39.499 | 26.419 | 27.878 | 10.793 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Project MDAP/MAIS Code:** 443

**A. Mission Description and Budget Item Justification**

Beginning in FY 2019, Mission Package funding is realigned into four (4) projects:

2550 Mine Countermeasures (MCM) Mission Package
2551 Anti-Submarine Warfare (ASW) Mission Package
2552 Surface Warfare (SUW) Mission Package
3129 LCS Mission Package Development

Prior to FY 2019 all Mission Package funding was in project 3129.

The LCS MM Program is utilizing an incremental development approach to deliver capability, which allows the continued insertion of mature capabilities throughout the life of the program without the need for modifications to the sea frames. Future Mine Countermeasures (MCM) MP capabilities will be considered when joint warfighting objectives or changing threats create new operational capability requirements that cannot be met by current mission package designs, or when new technological opportunities allow significant progress toward delivering cost effective, enhanced capabilities. Future mission module increments can be tested, constructed, and incorporated into existing mission packages, one of the most important benefits of LCS modular design.

The MCM MP will counter deep, shallow, and tethered mines in the littoral without putting Sailors in the minefield. When the MCM MP is embarked, LCS is capable of conducting detect-to-engage operations (hunting, sweeping, and neutralization) against very shallow to deep-water sea mine threats. The MCM MP provides these capabilities through the use of sensors and weapons deployed from an MH-60S multi-mission helicopter, unmanned off-board vehicles, and support equipment/ containers. The MCM MP consists of the following modules:

- Remote Minehunting (RMH) Module: MCM Unmanned Surface Vehicle (MCM USV) + AN/AQS-20 Minehunting Sonar
- Coastal Mine Reconnaissance (CMR) Module: Coastal Battlefield Reconnaissance & Analysis (COBRA) + MQ-8B Fire Scout Vertical Take-off and Landing Tactical Unmanned Aerial Vehicle (VTUAV)
- Near Surface Detection (NSD) Module: Airborne Laser Mine Detection System (ALMDS) + MH-60S Helicopter
- Airborne Mine Neutralization (AMN) Module: Airborne Mine Neutralization System (AMNS) + MH-60S Helicopter
- Unmanned Minesweeping (UMS) Module: Unmanned Influence Sweeping System (UISS) (MCM USV + Unmanned Surface Sweep System)
- Buried Minehunting (BMH) Module: Knifefish Unmanned Underwater Vehicle (UUV)

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>2550 / *Mine Countermeasure (MCM) Mission Package* |

The RMH Module provides sustained mine hunting and clearing from the surface, the UMS Module provides endurance bottom and volume sweep capability, the CMR Module will allow detection of minefield patterns and obstacles from an embarked Fire Scout VTUAV in the beach zone, and the BMH Module will allow detection of buried mines. When complete, the MCM MP will provide full capability against floating, tethered, bottom, and buried mines.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Mine Countermeasures (MCM) Mission Modules | 0.000 | 0.000 | 41.813 | 0.000 | 41.813 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Funded under project 3129 LCS Mission Package Development. | | | | | |
| ***FY 2019 Base Plans:***<br>For the Mine Countermeasures (MCM) Mission Package (MP) Remote Minehunting (RMH) Module, commence integration AN/AQS-20C on MCM USV + hunt and conduct initial at-sea tests. Testing requires chase boats, placement and removal of mines in a minefield. Commence integration of MCM USV + hunt on Independence variant. Modify MPAS 3.0.0.0 to incorporate MCM USV and AN/AQS-20C software.<br><br>For the MCM MP Airborne Mine Neutralization (AMN) Module, integrate and conduct at-sea tests on Freedom variant. Commence studies to Integrate Barracuda on the MCM USV. Certify AMN module for use on Freedom variant.<br><br>For the MCM MP Near Surface Detection (NSD) Module, integrate and conduct at-sea test on Freedom variant. Testing requires placement and removal of mines in a minefield along with 24 hours monitoring of minefield with an at-sea chase boat. Certify NSD module for use on Freedom variant.<br><br>For the MCM MP Coastal Mine Reconnaissance (CMR) Module, integrate and conduct at-sea test on Freedom variant. Certify CMR module for use on Freedom variant.<br><br>For the MCM MP Unmanned Minesweeping (UMS) module, conduct UISS at-sea Developmental Test (DT), conduct UMS integration, at-sea DT, and at-sea Operational Assessment (OA) on LCS Independence variant. Testing requires chase boats, placement and removal of mines in a minefield, and procurement of test spares and test support equipment. Modify MPAS 2.0.0.0 incorporating correction of software Problem Trouble Reports (PTRs) identified during UMS DT. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>2550 / *Mine Countermeasure (MCM) Mission Package* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| For the MCM Buried Minehunting (BMH) Module, conduct pier-side Knifefish Launch and Recovery demonstration, conduct integration and at-sea Knifefish DT and BMH DT on Independence variant. Testing requires placement and removal of mines in a minefield, and procurement of test spares and test support equipment. Modify MPAS 2.0.0.0 incorporating correction of software Problem Trouble Reports (PTRs) identified during BMH DT. Deliver and install common Post Mission Analysis (PMA) hardware on LCS.<br><br>For the entire MCM MP, conduct DT work-ups and at-sea MCM DT-B10 Phase I testing integrating AMN, NSD, CMR, RMH, UMS and BMH modules. Testing requires chase boats, placement and removal of mines in a minefield, procurement of test spares and test support equipment and at-sea chase craft to monitor the minefield 24/7.<br><br>In support of MCM MP, develop and delivery MCM Mission Package Application Software (MPAS) build 3.0.0.0. Perform systems engineering (risk management, information assurance, human systems integration, safety), configuration management and Integrated Logistics Support (ILS). Continue to compile system and package level Reliability and Maintainability (RAM-C) data to support reliability engineering and a prioritized initial spares list. Perform Full Operational Capability (FOC) RAM-C analysis with updated data and update RAM-C Rationale Report. Continue MCM MP Failure Reporting, Analysis, and Corrective Action System (FRACAS) effort. Integration and development efforts for vehicle-based MVCS are included within the corresponding module development.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Significant increase in at-sea testing of MCM MP on LCS Independence variant resulting from contractor delivery of MCM USV, Knifefish and UISS systems. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 0.000 | 41.813 | 0.000 | 41.813 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • 1600: *LCS Common Mission Modules Equipment* | 14.670 | 34.666 | 46.732 | - | 46.732 | 51.553 | 36.657 | 55.776 | 29.787 | 734.284 | 1,427.898 |
| • 1601: *LCS MCM Mission Modules* | 29.724 | 55.870 | 124.147 | - | 124.147 | 204.324 | 245.108 | 227.068 | 234.109 | 1,403.599 | 2,673.330 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>2550 / *Mine Countermeasure (MCM) Mission Package* |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|

**Remarks**

**D. Acquisition Strategy**

The LCS MM Acquisition Strategy is employing an incremental procurement approach to allow for the rapid introduction of additional capabilities as system technology matures. This phased plan provides incremental fielding of capability through the introduction of mature programs of record into the respective Mission Packages until the full baseline capability defined in the Capability Development Document (CDD) is reached.

**E. Performance Metrics**

Program Completed Milestone B January 2014
Complete MCM MP DT, TECHEVAL, and IOT&E on Independence variant
Achieve MCM MP Initial Operational Capability (IOC) on Independence variant
Conduct MCM MP DT, TECHEVAL, and IOT&E on Freedom variant

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>2550 / *Mine Countermeasure (MCM) Mission Package* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MCM MP | WR | NSWC PCD : Panama City, FL | 0.000 | 0.000 | | 0.000 | | 21.242 | Nov 2018 | - | | 21.242 | Continuing | Continuing | Continuing |
| MCM MP | Sub Allot | PMS 406 : Various | 0.000 | 0.000 | | 0.000 | | 5.000 | Feb 2019 | - | | 5.000 | 6.400 | 11.400 | - |
| MCM MP | Sub Allot | PMS 495 : Various | 0.000 | 0.000 | | 0.000 | | 1.000 | Feb 2019 | - | | 1.000 | 2.400 | 3.400 | - |
| MCM MP | WR | NSWC PHD : Port Hueneme, CA | 0.000 | 0.000 | | 0.000 | | 4.571 | Dec 2018 | - | | 4.571 | 12.800 | 17.371 | - |
| MCM MP | C/CPIF | Northrop Grumman : Bethpage, NY | 0.000 | 0.000 | | 0.000 | | 9.600 | Jan 2019 | - | | 9.600 | 4.800 | 14.400 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 41.413 | | - | | 41.413 | Continuing | Continuing | N/A |

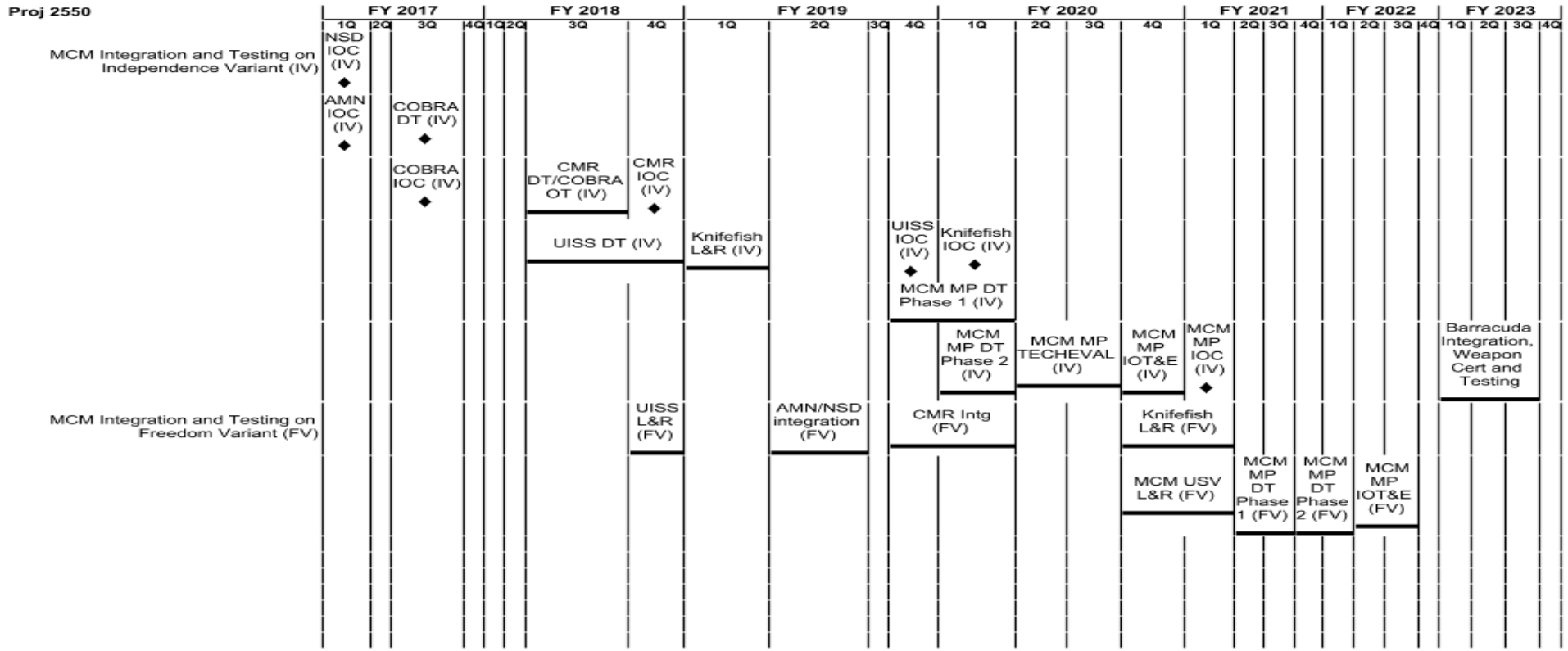
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MCM Program Management | C/CPFF | Booz Allen Hamilton : Washington, DC | 0.000 | 0.000 | | 0.000 | | 0.400 | Oct 2018 | - | | 0.400 | 1.680 | 2.080 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 0.400 | | - | | 0.400 | 1.680 | 2.080 | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 0.000 | | 41.813 | | - | | 41.813 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>2550 / *Mine Countermeasure (MCM) Mission Package* |




*2019PB - 0603596N - 2550*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>2550 / *Mine Countermeasure (MCM) Mission Package* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 2550*** | | | | |
| MCM Integration and Testing on Independence Variant (IV): NSD Mission Module (ALMDS) Certified for Operations (Indy Variant) | 1 | 2017 | 1 | 2017 |
| MCM Integration and Testing on Independence Variant (IV): AMN Mission Module (AMNS) Certified for Operations (Indy Variant) | 1 | 2017 | 1 | 2017 |
| MCM Integration and Testing on Independence Variant (IV): COBRA Mission System DT | 3 | 2017 | 3 | 2017 |
| MCM Integration and Testing on Independence Variant (IV): COBRA Mission System IOC | 3 | 2017 | 3 | 2017 |
| MCM Integration and Testing on Independence Variant (IV): CMR DT/COBRA at-Sea OT | 3 | 2018 | 3 | 2018 |
| MCM Integration and Testing on Independence Variant (IV): CMR Mission Module Certified for Operations | 4 | 2018 | 4 | 2018 |
| MCM Integration and Testing on Independence Variant (IV): UISS Mission System DT/ OA | 3 | 2018 | 4 | 2018 |
| MCM Integration and Testing on Independence Variant (IV): Knifefish L&R | 1 | 2019 | 1 | 2019 |
| MCM Integration and Testing on Independence Variant (IV): UISS Mission System IOC | 4 | 2019 | 4 | 2019 |
| MCM Integration and Testing on Independence Variant (IV): Knifefish Mission System IOC | 1 | 2020 | 1 | 2020 |
| MCM Integration and Testing on Independence Variant (IV): DT-B10 (Phase 1) | 4 | 2019 | 1 | 2020 |
| MCM Integration and Testing on Independence Variant (IV): DT-B10 (Phase 2) | 1 | 2020 | 1 | 2020 |
| MCM Integration and Testing on Independence Variant (IV): DT-C10 TECHEVAL | 2 | 2020 | 3 | 2020 |
| MCM Integration and Testing on Independence Variant (IV): OT-C10 IOT&E | 4 | 2020 | 4 | 2020 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>2550 / *Mine Countermeasure (MCM) Mission Package* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| MCM Integration and Testing on Independence Variant (IV): MCM MP IOC on Independence Variant | 1 | 2021 | 1 | 2021 |
| MCM Integration and Testing on Independence Variant (IV): Barracuda DT/OT | 1 | 2023 | 3 | 2023 |
| MCM Integration and Testing on Freedom Variant (FV): UISS L&R | 4 | 2018 | 4 | 2018 |
| MCM Integration and Testing on Freedom Variant (FV): AMN/NSD integration | 2 | 2019 | 2 | 2019 |
| MCM Integration and Testing on Freedom Variant (FV): CMR Integration | 4 | 2019 | 1 | 2020 |
| MCM Integration and Testing on Freedom Variant (FV): Knifefish L & R | 4 | 2020 | 1 | 2021 |
| MCM Integration and Testing on Freedom Variant (FV): MCM USV Launch & Recovery Plus Sweep | 4 | 2020 | 1 | 2021 |
| MCM Integration and Testing on Freedom Variant (FV): DT-B9 (Phase 1) | 2 | 2021 | 3 | 2021 |
| MCM Integration and Testing on Freedom Variant (FV): DT-B9 (Phase 2) | 4 | 2021 | 1 | 2022 |
| MCM Integration and Testing on Freedom Variant (FV): OT-C9 IOT&E | 2 | 2022 | 3 | 2022 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603596N / *(U)LCS Mission Modules* | Project (Number/Name)<br>2551 / *Anti-Submarine Warfare (ASW) Mission Package* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2551: *Anti-Submarine Warfare (ASW) Mission Package* | 0.000 | 0.000 | 0.000 | 41.553 | - | 41.553 | 19.180 | 9.282 | 8.884 | 8.500 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Project MDAP/MAIS Code:** 443

**A. Mission Description and Budget Item Justification**

Beginning in FY 2019, Mission Package funding is realigned into four (4) projects:

2550 Mine Countermeasures (MCM) Mission Package
2551 Anti-Submarine Warfare (ASW) Mission Package
2552 Surface Warfare (SUW) Mission Package
3129 LCS Mission Package Development

Prior to FY 2019 all Mission Package funding was in project 3129.

The ASW MP enables LCS to conduct detect-to-engage operations against modern submarines that pose a threat. Specific ASW capabilities include protecting forces in transit, protecting joint operating areas, and establishing ASW barriers. The ASW MP provides the warfighter capabilities that can be employed for ASW area search as well as high value unit escort missions. Key components of the ASW MP include a Light Weight Tow torpedo countermeasure, a Variable Depth Sonar, a Multi-Function Towed Array and sonar signal processing. These individual systems are combined into three modules: Torpedo Defense Module; an ASW Escort Mission Module that provides High value unit escort capability; and an Aviation Module that offers airborne threat localization and engagement capability through a MQ-8B Fire Scout VTUAV and an MH-60R with MK54 torpedoes.

This project will deliver the ASW Escort Mission Module Pre-Production Test Article (PPTA), the Torpedo Defense Module, and the Aviation Module in Q1FY19. Following the delivery, the ASW Mission Package will be installed on board Freedom Variant, and conducted subsequent Developmental Test & Evaluation (DT&E) and Initial Operational Test & Evaluation (IOT&E) and establish Initial Operational Capability (IOC) in FY19. In conjunction with integration and testing onboard a Freedom variant, the project will initiate shipboard integration of the Independence variant and will transition to production in FY19.

ASW Mission Package will take advantage of improvements developed under the submarine Advanced Processing Build (APB), Advanced Surveillance Build (ASB) and Advanced Capability Build (ACB) and will in turn share unique improvements developed under this program with the submarine, cruisers, destroyers and surveillance ASW communities. All programs (ACB, ASB, and APB) are managed under a common development process and titled AxB. This will contribute to the development of Littoral Combat Ship (LCS) ASW Mission Packages and the Guided Missile Frigate FFG(X) Program. While the LCS ASW MP will retains its uniqueness, and focus

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>2551 / *Anti-Submarine Warfare (ASW) Mission Package* |

in functional domains essential to mission package success, a premium is placed on development of common capabilities and modular architecture technologies to maximize commonality and cost effectiveness.

The Open System Architecture (OSA) and high performance COTS sonar processing hardware, as provided as an adjunct to the Mission Package Computing Environment (MPCE) will be fielded with the ASW Mission Package and will provide an opportunity to integrate emergent, transformational ASW technological improvements that were previously unachievable. The ASW Mission Package will require periodic upgrades to remain effective well into the 21st century and to pace the threat. Software upgrades target capability increases in high interest areas as prescribed by the Fleet and captured in campaign analysis. To achieve this, this project will package and deliver incremental upgrades every four years to the ASW Mission Package production program via an ACB development process by inserting maturing USW technologies and addressing hardware technology obsolescence.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Anti-Submarine Warfare (ASW) Mission Modules | 0.000 | 0.000 | 41.553 | 0.000 | 41.553 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Funded under project 3129 LCS Mission Package Development. | | | | | |
| ***FY 2019 Base Plans:***<br>PREPARE AND CONDUCT FORMAL TESTING ON FREEDOM VARIANT:<br>1.) Complete System Qualification Testing (SQT) of the EMM module<br>2.) Deliver the ASW Mission Package to the Land Based Integration Test Site (LBITS)<br>3.) Conduct End-to-End testing at the Land Based Integration Test Site (LBITS)<br>4.) Embark the ASW Mission Package and conduct Installation Check Out (INCO) procedures<br>5.) Conduct Crew Training<br>6.) Conduct ASW Mission Package Readiness Assessment (MPRA) /Mission Readiness Assessment (MRA) and certification the package to start formal developmental and operational testing on Freedom variant.<br>7.) Conduct formal developmental testing, TECHEVAL, and IOT&E on Freedom variant to support ASW MP Initial Operational Capability (IOC).<br><br>CONTINUE INTEGRATION OF ASW MP ON INDEPENDENCE VARIANT IN PREPARATION FOR FORMAL TESTING:<br>1.) Develop test requirements for the Independence Variant Ship Alteration (SHIPALT)<br>2.) Complete the Ship Installation Drawings (SIDs)<br>3.) Conduct ship checks | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>2551 / *Anti-Submarine Warfare (ASW) Mission Package* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| 4.) Complete development of ASW MP SHIPALT/PC for Independence variant in preparation for MP embark/ debark and developmental and operational testing in FY 2020.<br>5.) Work with shipbuilder to ensure work packages are developed and approved for execution during LCS Selected Restricted Availability (SRA) period.<br>6.) Finalize safety analysis of the ASW equipment on the Independence variant.<br>7.) Conduct ASW MP Weapon System Explosives Safety Review Board (WSESRB) to support ASW MP certification<br>8.) Finalize testing objectives, performance prediction modeling, and test plans to support the execution of an ASW MP developmental and operational testing of the ASW MP on Independence variant in FY 2020.<br>9.) Conduct at-sea end-to-end (E2E) integration testing on Independence variant hull to include ASW MP and combat system performance validation testing.<br><br>In support of transitioning EMM to production in FY19, the project will conduct System Qualification Testing (SQT), System Verification Review (SVR), Functional Configuration Audit (FCA), Physical Configuration Audit (PCA), validate sonar acoustic performance, validate shipboard interfaces, validate launch, handling and recovery, and conduct embarks and debarks. The project will conduct a Production Readiness Review (PRR) in Q3FY19.<br><br>Continue EMM acoustic processing software and hardware (ACB19 software and TI18 sonar signal processing hardware) which is a four-year cycle to address both software and hardware obsolescence.<br><br>Complete development of ASW MP operator training materials and course curriculum to support Train to Qualify and Train to Certify requirements. Continue development of component and system level modeling and simulation capabilities to enable high fidelity virtual reality training. Deliver Operations and Maintenance and fundamental courseware to LCS Training Facility. Continue Factory training events in support of formal courseware development.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>In FY19, the project will be increasing activities in support of formal testing on the Freedom variant, initiating shipboard integration on the Independence variant and installation of the SHIPALT on the Independence Variant, | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>2551 / *Anti-Submarine Warfare (ASW) Mission Package* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| initiation of the ACB19/TI18 in coordination with PEO IWS 5 and conducting crew training to support ship deployments starting in FY22.<br><br>In 2019, the ASW Mission Package will take advantage of improvements developed under the submarine Advanced Processing Build (APB), Advanced Surveillance Build (ASB) and Advanced Capability Build (ACB) and will in turn share unique improvements developed under this program with the submarine, cruisers, destroyers and surveillance ASW communities. All programs (ACB, ASB, and APB) are managed under a common development process and titled AxB. This will contribute to the development of Littoral Combat Ship (LCS) ASW Mission Packages and the Guided Missile Frigate (FFG(X)) Program. While the LCS ASW MP will retains its uniqueness, and focus in functional domains essential to mission package success, a premium is placed on development of common capabilities and modular architecture technologies to maximize commonality and cost effectiveness. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 0.000 | 41.553 | 0.000 | 41.553 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • 1600: *LCS Common Mission Modules Equipment* | 14.670 | 34.666 | 46.732 | - | 46.732 | 51.553 | 36.657 | 55.776 | 29.787 | 734.284 | 1,427.898 |
| • 1602: *LCS ASW Mission Modules* | 0.000 | 0.000 | 57.294 | - | 57.294 | 52.754 | 63.181 | 34.104 | 34.777 | 142.398 | 384.508 |

**Remarks**

**D. Acquisition Strategy**

The LCS MM Acquisition Strategy is employing an incremental procurement approach to allow for the rapid introduction of additional capabilities as system technology matures. This phased plan provides incremental fielding of capability through the introduction of mature programs of record into the respective Mission Packages until the full baseline capability defined in the Capability Development Document (CDD) is reached.

**E. Performance Metrics**

Program Completed Milestone B January 2014
Complete ASW MP DT, TECHEVAL, and IOT&E on Freedom variant
Achieve ASW MP IOC on Freedom variant
Complete ASW MP DT, TECHEVAL, and IOT&E on Independence variant

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603596N / *(U)LCS Mission Modules* | Project (Number/Name)<br>2551 / *Anti-Submarine Warfare (ASW) Mission Package* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2.0 ASW MP | Sub Allot | PEO IWS 5E : Various | 0.000 | 0.000 | | 0.000 | | 1.500 | Nov 2018 | - | | 1.500 | 0.000 | 1.500 | - |
| 2.0 ASW MP | WR | NUWC NPT : New Port RI | 0.000 | 0.000 | | 0.000 | | 2.370 | Nov 2018 | - | | 2.370 | Continuing | Continuing | Continuing |
| 2.0 ASW MP | WR | SSC PAC : San Diego, CA | 0.000 | 0.000 | | 0.000 | | 0.750 | Dec 2018 | - | | 0.750 | 0.000 | 0.750 | - |
| 2.0 ASW MP | WR | NUWC KPT : Keyport, Wa | 0.000 | 0.000 | | 0.000 | | 0.500 | Nov 2018 | - | | 0.500 | 0.000 | 0.500 | - |
| 2.0 ASW MP | C/CPFF | Northrop Grumman : Bethpage, NU | 0.000 | 0.000 | | 0.000 | | 2.800 | Jan 2019 | - | | 2.800 | 0.000 | 2.800 | - |
| 2.0 ASW MP | Sub Allot | PEO IWS 5A : Various | 0.000 | 0.000 | | 0.000 | | 10.000 | Mar 2019 | - | | 10.000 | Continuing | Continuing | Continuing |
| 2.0 ASW MP | C/CPFF | CSRA : Washington, DC | 0.000 | 0.000 | | 0.000 | | 0.255 | Jan 2019 | - | | 0.255 | 0.000 | 0.255 | - |
| 2.0 ASW MP | WR | NSWC DD : Dahlgren, VA | 0.000 | 0.000 | | 0.000 | | 0.225 | Nov 2018 | - | | 0.225 | 0.000 | 0.225 | - |
| 2.0 ASW MP | WR | SUP SHIP Bath : Bath, Me | 0.000 | 0.000 | | 0.000 | | 1.550 | Oct 2018 | - | | 1.550 | 0.000 | 1.550 | - |
| 2.0 ASW MP | MIPR | NAWC WD : Point Mugu, CA | 0.000 | 0.000 | | 0.000 | | 0.410 | Dec 2018 | - | | 0.410 | 0.000 | 0.410 | - |
| 2.0 ASW MP | C/FFP | Raytheon : Portmonth, RI | 0.000 | 0.000 | | 0.000 | | 4.210 | Nov 2018 | - | | 4.210 | 0.000 | 4.210 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 24.570 | | - | | 24.570 | Continuing | Continuing | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2.0 ASW MP Test and Evaluation (Freedom) | WR | COMOPTEVFOR : Norfolk, VA | 0.000 | 0.000 | | 0.000 | | 0.550 | Oct 2018 | - | | 0.550 | 0.000 | 0.550 | - |
| 2.0 ASW MP Test and Evaluation (Freedom) | WR | NSWC PHD : Port Hueneme, Ca | 0.000 | 0.000 | | 0.000 | | 1.766 | Dec 2018 | - | | 1.766 | 0.000 | 1.766 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>2551 / *Anti-Submarine Warfare (ASW) Mission Package* |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2.0 ASW MP Test and Evaluation (Freedom) | WR | Range Service : Var* | 0.000 | 0.000 | | 0.000 | | 3.154 | Oct 2018 | - | | 3.154 | 0.000 | 3.154 | - |
| 2.0 ASW MP Test and Evaluation (Freedom) | WR | NUWC NPT : Newport, RI | 0.000 | 0.000 | | 0.000 | | 7.362 | Dec 2018 | - | | 7.362 | 0.000 | 7.362 | - |
| 2.0 ASW MP Test and Evaluation (Freedom) | WR | NUWC KPT : Keyport, Wa | 0.000 | 0.000 | | 0.000 | | 2.600 | Nov 2018 | - | | 2.600 | 0.000 | 2.600 | - |
| 2.0 ASW MP Test and Evaluation (Freedom) | C/CPFF | Raytheon : Portmonth, RI | 0.000 | 0.000 | | 0.000 | | 1.000 | Jan 2019 | - | | 1.000 | 0.000 | 1.000 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 16.432 | | - | | 16.432 | 0.000 | 16.432 | N/A |

**Remarks**

* Testing will be conducted at Nanoose, BC for Light Weight Tow testing and in Hawaii for ASW MP testing.

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2.0 ASW MP | C/CPIF | Booz Allen Hamilton : Washington, DC | 0.000 | 0.000 | | 0.000 | | 0.551 | Jan 2019 | - | | 0.551 | 0.000 | 0.551 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 0.551 | | - | | 0.551 | 0.000 | 0.551 | N/A |

| | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 0.000 | | 41.553 | | - | | 41.553 | Continuing | Continuing | N/A |

**Remarks**

Beginning in FY 2019, Mission Package funding is realigned into four (4) projects:

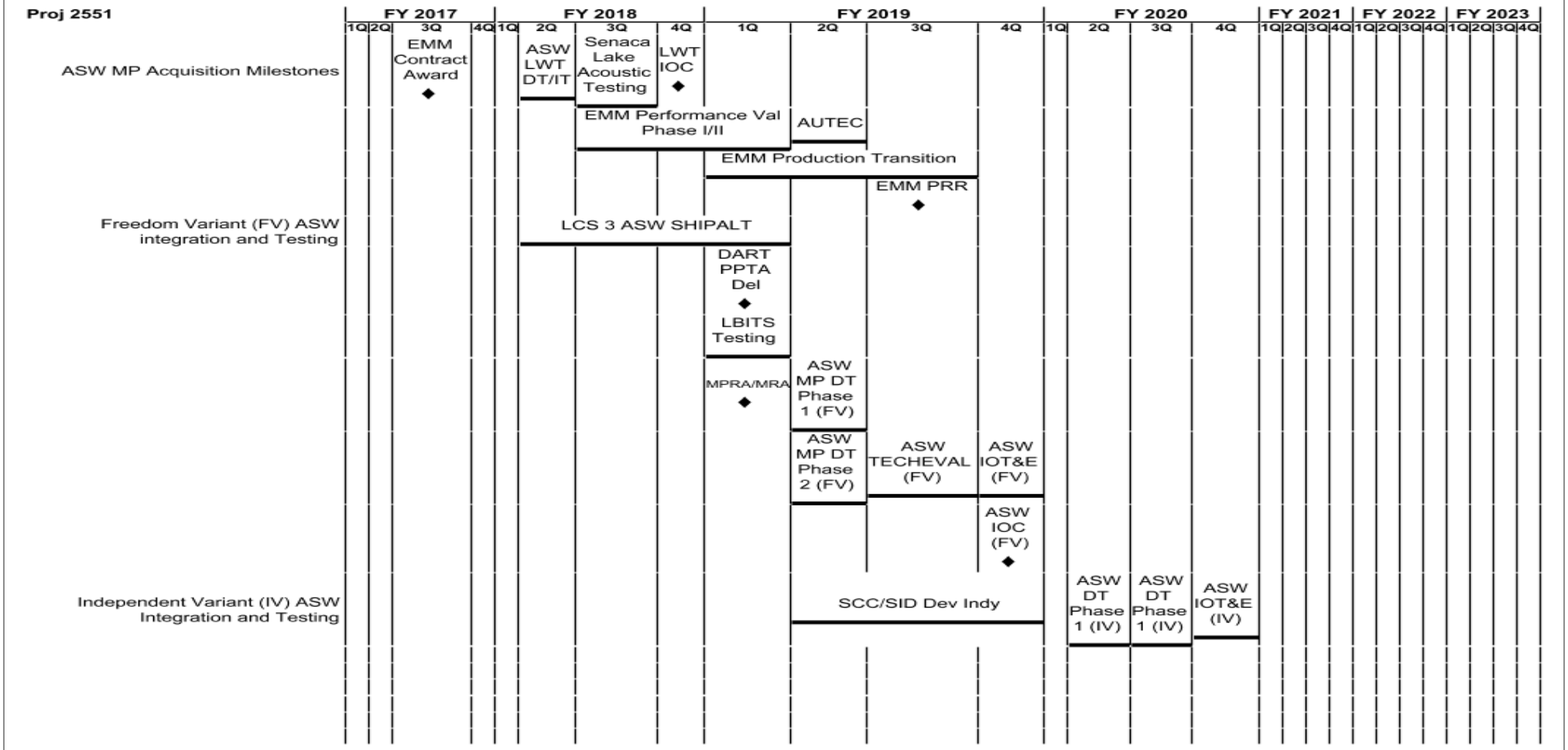
2550 Mine Countermeasures (MCM) Mission Package
2551 Anti-Submarine Warfare (ASW) Mission Package
2552 Surface Warfare (SUW) Mission Package
3129 LCS Mission Package Development

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603596N / *(U)LCS Mission Modules* | Project (Number/Name)<br>2551 / *Anti-Submarine Warfare (ASW) Mission Package* | |

| | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|

Prior to FY 2019 all Mission Package funding was in project 3129.

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>2551 / *Anti-Submarine Warfare (ASW) Mission Package* |




*2019PB - 0603596N - 2551*

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>2551 / *Anti-Submarine Warfare (ASW) Mission Package* |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>2551 / *Anti-Submarine Warfare (ASW) Mission Package* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 2551*** | | | | |
| ASW MP Acquisition Milestones: EMM Contract Award | 3 | 2017 | 3 | 2017 |
| ASW MP Acquisition Milestones: ASW MP LWT Developmental Testing (DT/IT) | 2 | 2018 | 2 | 2018 |
| ASW MP Acquisition Milestones: ASW MP LWT IOC | 4 | 2018 | 4 | 2018 |
| ASW MP Acquisition Milestones: Acoustic Characterization Senaca Lake | 3 | 2018 | 3 | 2018 |
| ASW MP Acquisition Milestones: EMM Component and System Level Performance Validation Dock Side Testing | 3 | 2018 | 1 | 2019 |
| ASW MP Acquisition Milestones: White Ship Testing AUTEC | 2 | 2019 | 2 | 2019 |
| ASW MP Acquisition Milestones: EMM Production Transition | 1 | 2019 | 3 | 2019 |
| ASW MP Acquisition Milestones: EMM Production Readiness Review | 3 | 2019 | 3 | 2019 |
| Freedom Variant (FV) ASW integration and Testing: ASW SHIPALT Installation and INCO | 2 | 2018 | 1 | 2019 |
| Freedom Variant (FV) ASW integration and Testing: DART Pre-Production Test Article Delivery | 1 | 2019 | 1 | 2019 |
| Freedom Variant (FV) ASW integration and Testing: ASW MP Land Based Integration and Testing | 1 | 2019 | 1 | 2019 |
| Freedom Variant (FV) ASW integration and Testing: ASW Mission Package Readiness Assessment (MPRA)/Mission Readiness Assessment | 1 | 2019 | 1 | 2019 |
| Freedom Variant (FV) ASW integration and Testing: ASW MP DT-B3 Phase 1 | 2 | 2019 | 2 | 2019 |
| Freedom Variant (FV) ASW integration and Testing: ASW MP DT-B3 Phase 2 | 2 | 2019 | 2 | 2019 |
| Freedom Variant (FV) ASW integration and Testing: ASW MP DT/IT-C3 TECHEVAL | 3 | 2019 | 3 | 2019 |
| Freedom Variant (FV) ASW integration and Testing: ASW MP OT-C3 | 4 | 2019 | 4 | 2019 |
| Freedom Variant (FV) ASW integration and Testing: ASW IOC | 4 | 2019 | 4 | 2019 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>2551 / *Anti-Submarine Warfare (ASW) Mission Package* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Independent Variant (IV) ASW Integration and Testing: ASW Mission Package SCD/ SID development for Independence | 2 | 2019 | 4 | 2019 |
| Independent Variant (IV) ASW Integration and Testing: ASW MP DT-B6 Phase 1 | 2 | 2020 | 2 | 2020 |
| Independent Variant (IV) ASW Integration and Testing: ASW MP DT-B6 Phase 2 | 3 | 2020 | 3 | 2020 |
| Independent Variant (IV) ASW Integration and Testing: ASW MP OT-C6 | 4 | 2020 | 4 | 2020 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603596N / *(U)LCS Mission Modules* | Project (Number/Name)<br>2552 / *Surface Warfare (SUW) Mission Package* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2552: *Surface Warfare (SUW) Mission Package* | 0.000 | 0.000 | 0.000 | 11.368 | - | 11.368 | 1.558 | 0.000 | 0.000 | 0.000 | 0.000 | 12.926 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Project MDAP/MAIS Code:** 443

**A. Mission Description and Budget Item Justification**

Beginning in FY 2019, Mission Package funding is realigned into four (4) projects:

2550 Mine Countermeasures (MCM) Mission Package
2551 Anti-Submarine Warfare (ASW) Mission Package
2552 Surface Warfare (SUW) Mission Package
3129 LCS Mission Package Development

Prior to FY 2019 all Mission Package funding was in project 3129.

The SUW MP increases firepower and offensive/defensive capabilities against large numbers of highly maneuverable, fast, small craft threats, giving LCS the ability to protect the sea lanes and move a force quickly through a choke point or other strategic waterway. The SUW MP is comprised of several modules including the Gun Mission Module (GMM), the Aviation Module, the Maritime Security Module (MSM), and the Surface-to-Surface Missile Module (SSMM). The GMM is comprised of two high velocity 30mm cannons and is augmented with the ship's 57mm gun to counter close in to mid-range threats. The Aviation Module uses the embarked MH-60R helicopter with Hellfire missile and the MQ-8B Fire Scout VTUAV for the detection, identification, and classification of surface contacts and to engage long range threats. The MSM supports the embarkation of a Visit, Board, Search, and Seizure (VBSS) team. The SSMM is a self-contained module consisting of 2 Missile Exhaust Containment Structures (MECS), integrated articulating hatch covers, a fire control system, and 12 two-rail M299 launchers to support load out and firing of 24 longbow hellfire missiles. SSMM provides missile coverage for mid-range threats and small boats.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Surface Warfare (SUW) Mission Modules | 0.000 | 0.000 | 11.368 | 0.000 | 11.368 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Funded under project 3129 LCS Mission Package Development. | | | | | |
| ***FY 2019 Base Plans:***<br>Complete IOT&E and establish IOC Q1FY19. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>2552 / *Surface Warfare (SUW) Mission Package* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Conduct Find, Fix, Repair efforts of SSMM EDM-2 to resolve issues found during Freedom variant testing and complete test reports.<br><br>Complete integration of SSMM with Independence variant Combat Management System (CMS), obtain WSESRB/SSSTRP approvals, and IA approvals necessary for formal shipboard testing on Independence variant.<br><br>Conduct analysis of test objectives and associated Measures of Effectiveness (MOEs) targeted for SSMM testing onboard Independence variant in support of developmental testing.<br><br>Assess performance envelope capabilities and conduct DOE testing. Conduct a TRACKEX, Structural Test Firing (STF), and a formal Developmental Test event on Independence variant.<br><br>Integrate SUW SSMM into Common Mission Package Trainer (CMPT) (2.4.4) for Independence variant. Develop and deliver courses and necessary updates to Common Skills, SUW Skills, and SSMM O&M training in support of ready for training in FY 2020.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Prior efforts for SUW are contained in 3129. SUW funding decreased from FY18 to FY19 as developmental efforts are completing and formal testing is beginning. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 0.000 | 11.368 | 0.000 | 11.368 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • 1600: *LCS Common Mission Module Equipment* | 14.670 | 34.666 | 46.732 | - | 46.732 | 51.553 | 36.657 | 55.776 | 29.787 | 734.284 | 1,427.898 |
| • 1603: *LCS SUW Mission Module* | 21.064 | 52.960 | 26.006 | - | 26.006 | 26.566 | 15.342 | 15.711 | 52.511 | 5.104 | 315.024 |
| • 4221: *LCS Module Weapons* | 2.776 | 13.110 | 11.350 | - | 11.350 | 14.585 | 14.417 | 13.825 | 14.103 | 37.555 | 121.721 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>2552 / *Surface Warfare (SUW) Mission Package* |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|

**Remarks**

**D. Acquisition Strategy**

The LCS MM Acquisition Strategy is employing an incremental procurement approach to allow for the rapid introduction of additional capabilities as system technology matures. This phased plan provides incremental fielding of capability through the introduction of mature programs of record into the respective Mission Packages until the full baseline capability defined in the Capability Development Document (CDD) is reached.

**E. Performance Metrics**

Program Completed Milestone B January 2014
Complete SUW MP DT, TECHEVAL, and IOT&E on Freedom variant
Complete SUW MP DT, TECHEVAL, and IOT&E on Independence variant

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603596N / *(U)LCS Mission Modules* | Project (Number/Name)<br>2552 / *Surface Warfare (SUW) Mission Package* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.0 SUW MP | MIPR | JAMS PO : Various | 0.000 | 0.000 | | 0.000 | | 1.350 | Jan 2019 | - | | 1.350 | 0.000 | 1.350 | - |
| 3.0 SUW MP | WR | NSWC DD : Dahlgren, VA | 0.000 | 0.000 | | 0.000 | | 5.098 | Nov 2018 | - | | 5.098 | 0.000 | 5.098 | - |
| 3.0 SUW MP | C/CPIF | Northrop Grumman : Bethpage, NY | 0.000 | 0.000 | | 0.000 | | 0.800 | Dec 2018 | - | | 0.800 | 0.000 | 0.800 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 7.248 | | - | | 7.248 | 0.000 | 7.248 | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.0 SUW MP | Sub Allot | NSWC PHD : Port Hueneme, CA | 0.000 | 0.000 | | 0.000 | | 2.720 | Nov 2018 | - | | 2.720 | 0.000 | 2.720 | - |
| 3.0 SUW MP | WR | NSWC Corona : Corona, CA | 0.000 | 0.000 | | 0.000 | | 0.950 | Jan 2019 | - | | 0.950 | 0.000 | 0.950 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 3.670 | | - | | 3.670 | 0.000 | 3.670 | N/A |

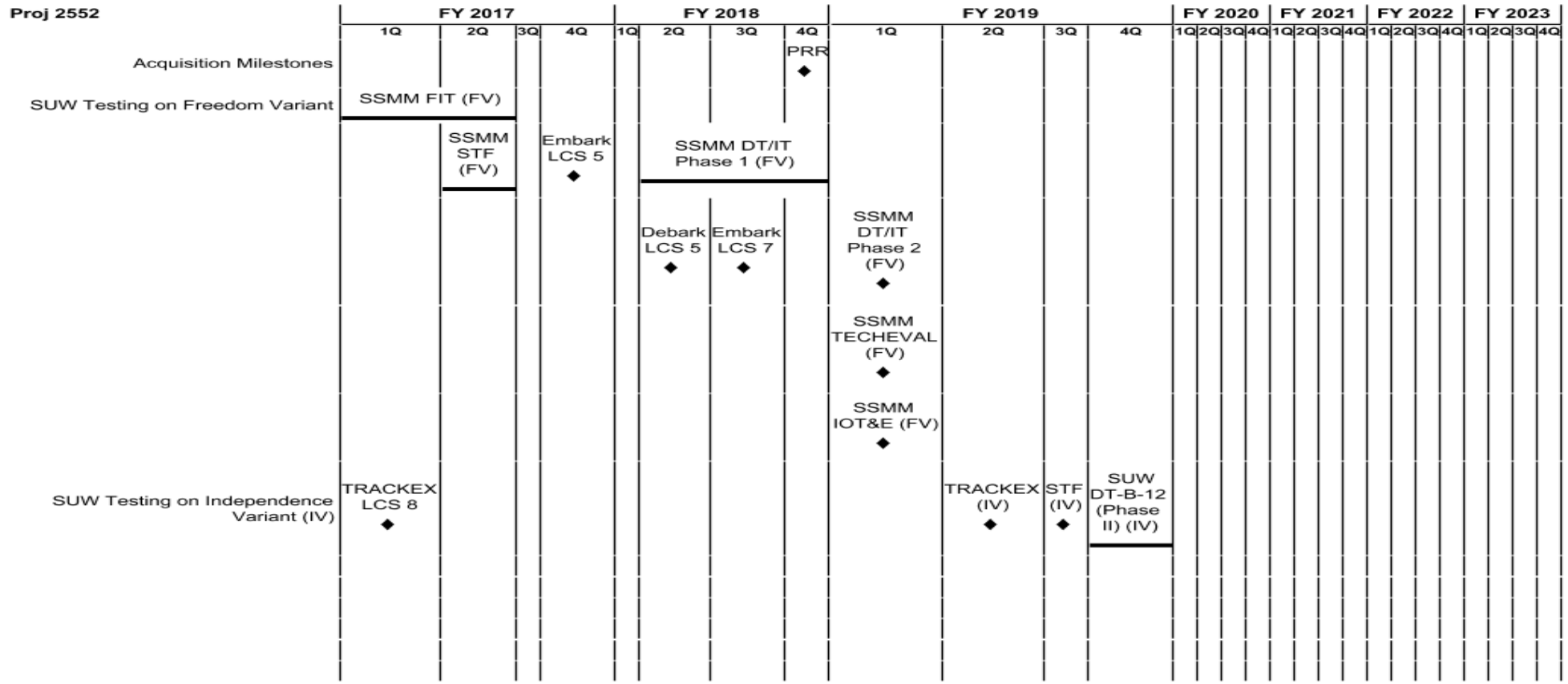
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.0 SUW MP | C/CPIF | Booz Allen Hamilton : Washington, DC | 0.000 | 0.000 | | 0.000 | | 0.450 | Jan 2019 | - | | 0.450 | 0.000 | 0.450 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 0.450 | | - | | 0.450 | 0.000 | 0.450 | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 0.000 | | 11.368 | | - | | 11.368 | 0.000 | 11.368 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>2552 / *Surface Warfare (SUW) Mission Package* |




*2019PB - 0603596N - 2552*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>2552 / *Surface Warfare (SUW) Mission Package* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 2552*** | | | | |
| Acquisition Milestones: Production Readiness Review | 4 | 2018 | 4 | 2018 |
| SUW Testing on Freedom Variant: Surface-to-Surface Missle Module Functional Integration Test (FIT) (Free Var) | 1 | 2017 | 2 | 2017 |
| SUW Testing on Freedom Variant: SSMM Structural Test Fire (STF) (Free Var) | 2 | 2017 | 2 | 2017 |
| SUW Testing on Freedom Variant: Embark on LCS 5 | 4 | 2017 | 4 | 2017 |
| SUW Testing on Freedom Variant: SSMM DT / IT Phase 1 (Free Var) | 2 | 2018 | 4 | 2018 |
| SUW Testing on Freedom Variant: Debark on LCS 5 | 2 | 2018 | 2 | 2018 |
| SUW Testing on Freedom Variant: Embark LCS 7 | 3 | 2018 | 3 | 2018 |
| SUW Testing on Freedom Variant: SSMM DT / IT Phase 2 (Free Var) | 1 | 2019 | 1 | 2019 |
| SUW Testing on Freedom Variant: SSMM TECEVAL (Free Var) | 1 | 2019 | 1 | 2019 |
| SUW Testing on Freedom Variant: SSMM IOT&E (Free Var) | 1 | 2019 | 1 | 2019 |
| SUW Testing on Independence Variant (IV): FIT Check & TRACKEX | 1 | 2017 | 1 | 2017 |
| SUW Testing on Independence Variant (IV): TRACKEX | 2 | 2019 | 2 | 2019 |
| SUW Testing on Independence Variant (IV): Structual Test FIre (STF) | 3 | 2019 | 3 | 2019 |
| SUW Testing on Independence Variant (IV): SUW Development Testing DT-B12 | 4 | 2019 | 4 | 2019 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | | | | | R-1 Program Element (Number/Name)<br>PE 0603596N / *(U)LCS Mission Modules* | | | | Project (Number/Name)<br>3129 / *LCS Mission Package Development* | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| 3129: *LCS Mission Package Development* | 371.619 | 153.595 | 116.871 | 8.899 | - | 8.899 | 10.311 | 9.356 | 9.254 | 9.410 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Project MDAP/MAIS Code:** 443

**A. Mission Description and Budget Item Justification**

Beginning in FY 2019, Mission Package funding is realigned into four (4) projects:

2550 Mine Countermeasures (MCM) Mission Package
2551 Anti-Submarine Warfare (ASW) Mission Package
2552 Surface Warfare (SUW) Mission Package
3129 LCS Mission Package Development

Prior to FY 2019 all Mission Package funding was in project 3129.

FY 2018 and Prior:
The SUW MP increases firepower and offensive/defensive capabilities against large numbers of highly maneuverable, fast, small craft threats, giving LCS the ability to protect the sea lanes and move a force quickly through a choke point or other strategic waterway. The SUW MP is comprised of several modules including the Gun Mission Module (GMM), the Aviation Module, the Maritime Security Module (MSM), and the Surface-to-Surface Missile Module (SSMM). The GMM is comprised of two high velocity 30mm cannons and is augmented with the ship's 57mm gun to counter close in to mid-range threats. The Aviation Module uses the embarked MH-60R helicopter with Hellfire missile and the MQ-8B Fire Scout VTUAV for the detection, identification, and classification of surface contacts and to engage long range threats. The MSM supports the embarkation of a Visit, Board, Search, and Seizure (VBSS) team. The SSMM is a self-contained module consisting of 2 Missile Exhaust Containment Structures (MECS), integrated articulating hatch covers, a fire control system, and 12 two-rail M299 launchers to support load out and firing of 24 longbow hellfire missiles. SSMM provides missile coverage for mid-range threats and small boats.

The ASW MP enables LCS to conduct detect-to-engage operations against modern submarines that pose a threat. Specific ASW capabilities include protecting forces in transit, protecting joint operating areas, and establishing ASW barriers. The ASW MP provides the warfighter capabilities that can be employed for ASW area search as well as high value unit escort missions. Key components of the ASW MP include a Light Weight Tow torpedo countermeasure, a Variable Depth Sonar, and a Multi-Function Towed Array. These individual systems are combined into three modules: Torpedo Defense Module; an ASW Escort Mission Module that provides High value unit escort capability; and an Aviation Module that offers airborne threat localization and engagement capability through a MQ-8B Fire Scout VTUAV and an MH-60R with MK54 torpedoes.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>3129 / *LCS Mission Package Development* |

The LCS Mine Countermeasures (MCM) MP will counter deep, shallow, and tethered mines in the littoral without putting Sailors in the minefield. When the MCM MP is embarked, LCS is capable of conducting detect-to-engage operations (hunting, sweeping, and neutralization) against very shallow and deep-water sea mine threats. The MCM MP provides these capabilities through the use of sensors and weapons deployed from an MH-60S multi-mission helicopter, unmanned off-board vehicles, and support equipment/containers. The MCM MP consists of the following modules:
- Remote Minehunting (RMH) Module: MCM Unmanned Surface Vehicle (MCM USV) + AN/AQS-20 Minehunting Sonar
- Coastal Mine Reconnaissance (CMR) Module: Coastal Battlefield Reconnaissance & Analysis (COBRA) + MQ-8B Fire Scout Vertical Take-off and Landing Tactical Unmanned Aerial Vehicle (VTUAV)
- Near Surface Detection (NSD) Module: Airborne Laser Mine Detection System (ALMDS) + MH-60S Helicopter
- Airborne Mine Neutralization (AMN) Module: Airborne Mine Neutralization System (AMNS) + MH-60S Helicopter
- Unmanned Minesweeping (UMS) Module: Unmanned Influence Sweep System (UISS) (MCM USV + Unmanned Surface Sweep System)
- Buried Minehunting (BMH) Module: Knifefish Unmanned Underwater Vehicle (UUV)

The RMH Module provides sustained mine hunting and clearing from the surface, the UMS Module provides endurance bottom sweep capability, the CMR Module will allow detection of minefield patterns and obstacles from an embarked Fire Scout VTUAV in the beach zone, and the BMH Module will allow detection of buried mines. When complete, the MCM MP will provide full capability against floating, tethered, bottom, and buried mines.

FY 2019 funding includes:

The LCS MM Common Equipment consists of enabling products required by all MPs to provide common hardware interfaces, computer operating environment, communications systems, aviation interface systems, and portable development & integration test-sets. Common hardware interfaces include definition, installation, and control of mechanical, electrical, and cooling requirements common to all mission packages. The Mission Package Computing Environment (MPCE) provides common services and Operating Environment to support all Mission Package Application Software and Open Architecture Products. The Multi-Vehicle Communications System (MVCS) enables the control and data exchange of simultaneous unmanned mission vehicles and the Ship. Aviation interface systems include integration and management of data communications, data processing, and physical hardware interfaces such as common equipment and containers used by all mission packages. Development and integration test-sets provide a mobile operating environment installed in the Mission Package Portable Control Stations (MP-PCS) to serve as a surrogate Ship during mission package development and integration test events at test ranges.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Mine Countermeasure (MCM) Mission Package | 38.892 | 21.852 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>For the Mine Countermeasures (MCM) Mission Package (MP), certify Airborne Mine Neutralization (AMN) and Near Surface Detection (NSD) Modules and employ on LCS Independence variant. Commence integration of AN/AQS-20C and MCM USV+hunt into MCM MP. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>3129 / *LCS Mission Package Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| For the MCM MP Coastal Mine Reconnaissance (CMR) module, complete at-sea Developmental Testing (DT) and COBRA Operational testing (OT) on Independence Variant. Conduct CMR cyber testing. Certify CMR module and employ on LCS Independence variant. Integrate CMR Post Mission Analysis (PMA) workstation on Freedom Variant. Modify Mission Package Application Software (MPAS) 1.7.0.0 software incorporating correction of software Problem Trouble Reports (PTRs) identified during CMR DT.<br><br>For the MCM MP Unmanned Mine-sweeping (UMS) Module, integrate Unmanned Influence Sweep System (UISS) into MCM MP. Conduct Independence variant Launch and Recovery (L&R) capture line mechanism testing. Conduct UISS testing into MCM MP. Deliver MPAS 2.0.0.0.<br><br>In support of MCM MP, commence development of MCM MPAS build 3.0.0.0 incorporating Net-Centric Sensor Analysis for MIW (NSAM) software and Cyber-security Toolkit (CSTK). Perform systems engineering (risk management, information assurance, human systems integration, safety), configuration management and Integrated Logistics Support. Develop common Post Mission Analysis hardware for Organic Post Mission Analysis (OPMA), NSAM, COBRA and Knifefish PMA. Continue to compile system and package level Reliability and Maintainability (RAM-C) data to support reliability engineering and a prioritized initial spares list. Perform Full Operational Capability (FOC) RAM-C analysis with updated data and update RAM-C Rationale Report. Continue MCM MP FRACAS effort.<br><br>***FY 2019 Base Plans:***<br>Funded under Project Unit (PU) 2550 for FY 2019.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY19 efforts have been moved to Project 2550 | | | | | |
| ***Title:*** Anti-Submarine Warfare (ASW) Mission Package | 29.541 | 49.868 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY 2018 plan updated to reflect programmatic changes due to the competitive award of the Escort Mission Module development and production contract. The contract was still under evaluation at the time of the PB18 submit and the program was unable to document the schedule forward until the down-select was complete. The following reflects those changes. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>3129 / *LCS Mission Package Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Perform systems engineering (risk management, information assurance, human systems integration, safety), configuration management and Integrated Logistics Support. Continue to compile system and package level Reliability and Maintainability (RAM-C) data to support reliability engineering and a prioritized initial spares list. Perform Full Operational Capability (FOC) RAM-C analysis with updated data and update RAM-C Rationale Report. Continue ASW MP FRACAS effort.<br><br>Continue development of ASW MP operator training materials and course curriculum to support Train to Qualify and Train to Certify requirements. Continue development of component and system level modeling and simulation capabilities to enable high fidelity virtual reality training. Deliver Operations and Maintenance and fundamental courseware to LCS Training Facility. Continue Factory training events in support of formal courseware development.<br><br>ASW Mission Package Engineering Reviews:<br>1.) Close-out ASW MP Preliminary Design Review (PDR) by completing engineering efforts to resolve or adjudicate critical Request for Actions (RFA).<br><br>2.) Prepare detailed Technical Data package (TDP) to support ASW MP Critical Design Review (CDR) event. Conduct CDR and close-out ASW MP CDR by completing efforts to resolve or adjudicate critical Request for Actions (RFA).<br><br>Prepare to deliver and install Escort Mission Module (EMM) on LCS 3 and prepare for formal ASW MP testing which will begin in FY 2019:<br><br>1.) Continue development of EMM Pre-Production Test Article (PPTA) through contractor level testing on EMM contract. Participate in EMM design reviews and feasibility testing to verify performance. Continue ship integration activities required to enable hardware installation of EMM equipment onboard LCS platforms.<br><br>2.) Exercise EMM contract Integration and Testing Support CLIN in support of ship and mission module Integration, Testing, Validation and Verification (V&V), Certification and Delivery.<br><br>3.) Oversee and support execution of shipboard industrial work in accordance with ASW MP Ship Alteration Permanent Change (SHIPALT/PC) Technical Data Package (TDP) and any additional MM installation ECPs | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>3129 / *LCS Mission Package Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| as necessary to support ASW MP Installation and deployment on LCS. Complete SHIPALT/PC for Freedom variant and initiate development of SHIPAL/PC for Independence variant.<br><br>4.) Finalize safety analysis of the ASW equipment on the Freedom variant and begin detailed safety analyses on the Independence variant. Conduct ASW MP Weapon System Explosives Safety Review Board (WSESRB) to support ASW MP certification to be conducted in FY 2019 to support formal test on Freedom variant.<br><br>5.) Finalize testing objectives, performance prediction modeling, and test plans to support the execution of an ASW MP developmental and operational testing of the ASW MP on Freedom variant in FY 2019.<br><br>6.) Conduct mission module and mission package level integration testing, including events at PAX River SAIL for Aviation integration, Combat Management System (CMS) integration and performance validation testing in support of ASW MP.<br><br>7.) Plan and conduct ASW MP Land Based and at-sea end-to-end (E2E) integration testing on Freedom variant hull to include ASW MP and combat system performance validation testing.<br><br>8.) Complete EMM acoustic processing software and hardware (ACB13L software and TI14 hardware), Aviation integration support software, and Command and Control software development to support software certification in FY 2019 to support formal developmental and operational testing. Initiate development of ACB19/TI18 to support production buys.<br><br>Complete development and install Torpedo Defense Module on Freedom Variant:<br><br>1.) Integrate Torpedo Defense Module (Light Weight Tow) EDM units onto each LCS variant with Class I (PCW/SCD) changes. Complete installation of equipment on LCS 1 and LCS 3.<br><br>2.) Conduct initial integration and proof of performance testing of the Light Weight Tow system. Testing to be performed aboard LCS platforms at the Canadian Fleet Maritime Experimental Testing Range (CFMETR) against instrumented torpedoes.<br><br>3.) Develop production data package for Torpedo Defense Module to support a production contract RFP and award in FY 2019. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>3129 / *LCS Mission Package Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Develop the products necessary for mission package turnover to sustainment, such as Provisioning Technical Documents, Class Maintenance Plan (CMP), Diminishing Manufacturing Sources/Material Sources (DMSMS) Plan, embark/debark procedures, Consolidated Shipboard Allowance List (COSAL), Navy Training System Plan (NTSP), and Depot Source of Repair (DSOR).<br>***FY 2019 Base Plans:***<br>Funded under Project Unit (PU) 2551 for FY 2019.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Effort beyond FY18 are funded under Project Unit (PU) 2551. | | | | | |
| ***Title:*** Surface Warfare (SUW) Mission Package | 42.552 | 17.647 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Continue to conduct combat system certification, MP certification, obtain WSESRB/SSSTRP approvals, and IA approvals in for completion of formal shipboard test events.<br><br>Start formal shipboard Developmental Testing DT/IT-B11 (Phase I) on LCS 5 and after debarking from LCS 5 and embarking on LCS 7 the project will complete DT/IT-B11 (Phase I), complete all test planning and procedures for DT-C11 (TECHEVAL), and Operational Testing OT-C11 (IOT&E) in support of testing in Q1FY19.<br><br>In support of transitioning SSMM to production in FY18, the project will conduct System Qualification Testing (SQT), System Verification Review (SVR), Functional Configuration Audit (FCA), Physical Configuration Audit (PCA), validate sonar acoustic performance, validate shipboard interfaces, validate launch, handling and recovery, and conduct embarks and debarks. The project will conduct a Production Readiness Review (PRR) in Q4FY18.<br><br>Complete FMECA, LORA, and MTA associated with maturity levels of development EDM-2. Complete RCM analysis for finalizing MIPs, MRCs upon finalizing EDM to contribute to development of Technical Manuals. Conduct Reliability, Maintainability, and Availability efforts in support of Freedom variant IOC. Conduct ILS support efforts in support of Freedom variant to include SSMM Provisioning, Supply Support, PHS&T, Preliminary AL, APL, CSOSS, data management and delivery of preliminary EOD 60 series manual. Finalize SSMM development, verification, validation and delivery of final tech manuals. Continue to develop I-level | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>3129 / *LCS Mission Package Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Technical Manual for Incr. III SSMM, M299 and MECS. Develop SSMM Embark/Debark plan. Continue development of SSMM Operations and Maintenance Technical Manual. Continue development of SSMM facilities requirements. Complete PHS&T plan update with SSMM data. Complete SSMM O&M Training plan and update course development. Finalize M299 TM in compliance with O and I level requirements. Complete SERD, including I level requirements. Complete SSMM facilities requirements. Finalize all loading procedures/methods.<br><br>Integrate SSMM into Common Mission Package Trainer (CMPT) (2.4.4) for Freedom variant. Develop and deliver courses and necessary updates to Common Skills, SUW Skills, and SSMM O&M in support of ready for training.<br><br>Continue PR resolution and analysis of GD ROM in support of SSMM integration of ICMS aboard Independence Variant<br><br>Continue to compile system and package level Reliability and Maintainability (RAM-C) data to support reliability engineering and a prioritized initial spares list. Perform FOC RAM-C analysis with updated data and update RAM-C Rationale Report. Continue SUW MP FRACAS effort.<br>***FY 2019 Base Plans:***<br>Funded under Project Unit (PU) 2552 for FY 2019.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Effort beyond FY18 are funded under Project Unit (PU) 2552 | | | | | |
| ***Title:*** Command, Control, Communication, Computers, Cyber and Intelligence (C5I) and Mission Package Tactical Team Trainers | 8.554 | 10.082 | 8.899 | 0.000 | 8.899 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Mission Package Computing Environment (MPCE):<br>Continue to conduct MPCE Modernization and Technology Refresh efforts. Conduct Formal MPCE v1.10 Critical Design Review (CDR) and factory training. Conduct MPCE grooming to support MCM, ASW and SUW MP test events. Transition to a common Mission Package Operating Environment (MPOE) / Mission Package Services (MPS) software baseline. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>3129 / *LCS Mission Package Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Finalize Program Protection Plan.<br><br>Conduct Maintenance Demonstration (M-DEMO) to validate the effectiveness and execution performance of the delivered technical documentation and the Maintenance planning products.<br><br>Multi Vehicle Communications System (MVCS):<br>Finalize and deliver the MVCS v1.2 baseline resulting in an ECP and SCD package. Continue on the design and development of MVCS v1.2.X to implement the CDS hardware replacement due to the existing solution reaching end of life and the implementation of the IPS-250 Inline Encryptor. Support efforts to implement crypto and the replacement CDS on Unmanned Influence Sweep System (UISS) and Knifefish Unmanned Undersea Vehicle. Groom MVCS v1.2 for integration and perform pre-integration activities aboard the Freedom variant LCS 3 in preparation for MVCS v1.2 installation in support of UISS testing. Develop and install solution to provide SIPRNet access aboard the Freedom variant. Finalize development and complete the Seminal Transition Event test to close out the RT-1944A/U Rapid Innovation Fund project. Continue development efforts of the Beyond Line of Site (BLOS) capability provided by the High Frequency Ground Wave (HFGW) system to include integrating the HFGW into the MVCS. Perform Topside Analysis of both LCS variants to determine antenna location and performance in support of the HFGW system. Complete the Spectrum Supportability Risk Assessment for implementing the HFGW on the ship. Continue development on the Extended Line of Site (ELOS) solution Unmanned Aerial Relay (UMAR) Rapid Innovation Fund effort. Continue development of the Anti-Jam MAGIC SHIELD solution for integration into the RT-1944A/U. Perform an analysis to determine the amount of bandwidth required for remote mine hunting at various operating distances. Begin efforts to define and develop MVCS v1.3. Continue to conduct Tech Refresh/Insertion studies needed to sustain incremental MVCS capability upgrades. Provide curriculum development for the MVCS v1.2 baseline.<br><br>Provide differences training on MVCS to fleet and curriculum updates for Combat Systems courses.<br><br>Common Mission Package Trainer (CMPT):<br>Complete incremental update to integrate MCM MP Coastal Mine Reconnaissance (CMR) Module and SUW Surface-to-Surface Missile Module (SSMM) capabilities into CMPT. Complete integration of updated software with Freedom and Independence Combat Management System Trainers and conduct standalone and integrated team training at LTF for detachments. Begin update to integrate MCM Unmanned Sweep Module and Remote Minehunting Module capabilities into CMPT. Begin update to integrate ASW Escort Mission Module, Torpedo Defense Module, and Aviation Module capabilities into CMPT. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603596N / *(U)LCS Mission Modules* | Project (Number/Name)<br>3129 / *LCS Mission Package Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Continue to compile system data to support Reliability and Maintainability (RAM-C) data to support reliability engineering and analysis. Begin FRACAS effort. | | | | | |
| ***FY 2019 Base Plans:***<br>Finalize the design and development of MVCS v1.2.X to implement the CDS hardware replacement due to the existing solution reaching end of life and the implementation of the IPS-250 Inline Encryptor. Complete development to update the Ship Configuration Agent (SCA) as part of the MVCS 1.2.X baseline due to integration with the Knifefish, UISS and MCM USV. Finalize the development of the Anti-Jam MAGIC SHIELD solution for procurement and integration into the RT-1944A/U. Complete development required to support the MVCS v1.2.X for Integration Test. Continue development efforts of the Beyond Line of Site (BLOS) capability provided by the High Frequency Ground Wave (HFGW) system to include beginning the fabrication of 3 Engineering Development Models (EDMs), adding Emission Control (EMCON), providing spectrum and topside analysis support, begin adaptive noise cancelling firmware development, complete Performance Monitor Fault Location (PMFL) and Built In Test (BIT) design and implementation, conduct an Electromagnetic Interference (EMI) test, perform an initial Anti?Jam antenna and signal assessment, begin test fixture software for production, provide support for MVCS/Seaframe integration and CDS rule-set reprogramming, initiate Freedom variant and USV/UISS Noise assessment, and conduct an Engineering Sea test. Continue development on the Extended Line of Site (ELOS) solution Unmanned Aerial Relay (UMAR) Rapid Innovation Fund effort. Continue to conduct Tech Refresh/Insertion studies needed to sustain incremental MVCS capability upgrades. | | | | | |
| Develop MVCS differences training and deliver for inclusion in LCS Combat Systems courses. | | | | | |
| Common Mission Package Trainer (CMPT):<br>Update CMPT to integrate MCM Unmanned Sweep Module, Remote Minehunting Module, and begin integration of Buried Minehunting Module capabilities. Complete update to incorporate ASW Escort Mission Module, Torpedo Defense Module, and Aviation Module capabilities. Continue to integrate updated software with Freedom and Independence variant Combat Management System Trainers and conduct standalone and integrated team training at LTF for detachments. | | | | | |
| Continue to compile system data to support Reliability and Maintainability (RAM-C) data to support reliability engineering and analysis. Continue FRACAS effort. | | | | | |
| ***FY 2019 OCO Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>3129 / *LCS Mission Package Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>In FY18 MPCE transitioned to Sustainment. | | | | | |
| ***Title:*** System Engineering and Program Acquisition | 34.056 | 17.422 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Systems Engineering Efforts:<br>Support all major planned systems engineering events per the LCS Mission Modules Systems Engineering Plan (SEP) for all modules within the three warfare areas (Surface Warfare, Anti-Submarine Warfare, and Mine Countermeasures Warfare).<br><br>Continue to develop and implement process to track lead/lag systems engineering metrics to include requirements,<br>Requirements Traceability & Verification Matrix (RTVM), and SRLs and continued to implement the Technical Performance Measurement (TPM) Plan.<br><br>Continue to maintain and execute Cyber Security Strategy.<br><br>Program Management Efforts:<br>Conduct business and administrative planning, organizing, directing, coordinating, controlling, and approval actions designated to accomplish overall program objectives that are not associated with specific hardware elements or included in systems engineering.<br><br>Common Training Management Efforts:<br>Continue executing four training Integrated Project Teams (IPTs): MCM, SUW, ASW, and Common systems.<br>Continued development of training and training systems for MCM, ASW, and SUW Mission Module Sailors in accordance with Navy Training Support Plan (NTSP).<br><br>Begin incorporation of SUW Surface-to-Surface Missile Module capability into LCS Training Facility (LTF) training courses to meet SUW MP Train to Certify (T2C) requirement and achieve Ready for Training (RFT) in FY 2020. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>3129 / *LCS Mission Package Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Begin development of ASW MP Escort Mission Module and Torpedo Defense capabilities into LTF training courses to meet ASW MP T2C requirement and achieve RFT in FY 2020.<br><br>Begin incorporation of MCM Buried Minehunting, Unmanned Sweep, and Remote Minehunting Module capabilities into LTF training courses to meet MCM MP T2C requirement and achieve RFT in FY 2021.<br><br>Perform vendor and interim training in preparation for deployment.<br><br>Perform analysis of training to validate effective training delivery and updated formal curriculum to incorporate findings from program test events, operations and classroom experience to deliver training that will achieve Train to Certify KPP.<br><br>Continue to integrate LCS MM program training with LCS platform program training.<br>***FY 2019 Base Plans:***<br>N/A<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Beginning in FY19, all systems engineering and program management efforts have been aligned to the specific mission packages (Project 2550 for MCM, Project 2551 for ASW, and Project 2552 for SUW). | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 153.595 | 116.871 | 8.899 | 0.000 | 8.899 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • 1600: *LCS Common Mission Modules Equipment* | 14.670 | 34.666 | 46.732 | - | 46.732 | 51.553 | 36.657 | 55.776 | 29.787 | 734.284 | 1,427.898 |
| • 1601: *LCS MCM Mission Modules* | 29.724 | 55.870 | 124.147 | - | 124.147 | 204.324 | 245.108 | 227.068 | 234.109 | 1,403.599 | 2,673.330 |
| • 1602: *LCS ASW Mission Modules.* | 0.000 | 0.000 | 57.294 | - | 57.294 | 52.754 | 63.181 | 34.104 | 34.777 | 142.398 | 384.508 |
| • 1603: *LCS SUW Mission Modules* | 21.064 | 52.960 | 26.006 | - | 26.006 | 26.566 | 15.342 | 15.711 | 52.511 | 5.104 | 315.024 |
| • 4221: *LCS Module Weapons* | 2.776 | 13.110 | 11.350 | - | 11.350 | 14.585 | 14.417 | 13.825 | 14.103 | 37.555 | 121.721 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>3129 / *LCS Mission Package Development* |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|

**Remarks**

**D. Acquisition Strategy**

The LCS Mission Module Acquisition Strategy is employing an incremental procurement approach to allow for the rapid introduction of additional capabilities as system technology matures. This phased plan provides incremental fielding of capability through the introduction of mature programs of record into the respective Mission Packages until the full baseline capability defined in the Capability Development Document (CDD) is reached.

**E. Performance Metrics**

Program Completed Milestone B January 2014
Complete SUW MP DT, TECHEVAL, and IOT&E on Freedom variant
Achieve SUW MP Initial Operational Capability (IOC) on Freedom variant
Achieve MCM MP IOC on Independence variant (Refer to Project Unit 2550)
Achieve ASW MP IOC on Freedom variant (Refer to Project Unit 2551)

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603596N / *(U)LCS Mission Modules* | Project (Number/Name)<br>3129 / *LCS Mission Package Development* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6.1 System Engineering | WR | NSWC PCD : Panama City, FL | 0.000 | 0.000 | | 0.275 | Oct 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.275 | - |
| 6.1 System Engineering | WR | NSWC DD : Dahlgren, VA | 0.000 | 1.031 | Nov 2016 | 0.753 | Oct 2017 | 0.000 | | - | | 0.000 | 0.000 | 1.784 | - |
| 6.1 System Engineering | WR | NAVSEALOGCEN : Norfolk, VA | 0.731 | 0.620 | Dec 2016 | 0.169 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 1.520 | - |
| 6.1 System Engineering | C/CPFF | Northrop Grumman : Bethpage, NY | 9.210 | 4.225 | Dec 2016 | 1.107 | Dec 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| 6.1 System Engineering | WR | NSWC Carderock : Bethesda, MD | 1.530 | 1.000 | Nov 2016 | 0.080 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 2.610 | - |
| 6.1 System Engineering | WR | NSWC PHD : Port Hueneme, CA | 1.108 | 0.350 | Jan 2017 | 0.110 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 1.568 | - |
| 6.1 System Engineering | WR | SPAWAR PAC : San Diego, CA | 5.931 | 1.500 | Dec 2016 | 0.229 | Nov 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| 6.1 System Engineering | C/CPIF | Booz Allen Hamilton : Washington, DC | 0.000 | 0.000 | | 0.355 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.355 | - |
| 6.4 Integration, Assembly, Test and Checkout | Sub Allot | CECOM Bldg 1207 : Various | 0.842 | 0.250 | Feb 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.092 | - |
| 6.4 Integration, Assembly, Test and Checkout | WR | NAWC AD : Patuxent River, MD | 0.300 | 0.950 | Mar 2017 | 0.680 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 1.930 | - |
| 6.4 Integration, Assembly, Test and Checkout | WR | NSWC DD : Dahlgren, VA | 0.000 | 0.000 | | 0.203 | Oct 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.203 | - |
| 6.4 Integration, Assembly, Test and Checkout | WR | NSWC PC : Panama City, FL | 0.000 | 0.000 | | 0.075 | Oct 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.075 | - |
| 6.4 Integration, Assembly, Test and Checkout | C/CPFF | Northrop Grumman : Bethpage, NY | 1.248 | 0.250 | Jan 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.498 | - |
| 6.4 Integration, Assembly, Test and Checkout | WR | NSWC Carderock : Bethesda, MD | 6.977 | 1.000 | Dec 2016 | 0.648 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 8.625 | - |
| 6.4 Integration, Assembly, Test and Checkout | C/CPFF | PMS 501 : Various | 0.000 | 0.000 | | 1.075 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 1.075 | - |
| 6.4 Integration, Assembly, Test and Checkout | WR | SPAWAR PAC : San Diego, CA | 0.580 | 0.750 | Jan 2017 | 0.527 | Feb 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603596N / *(U)LCS Mission Modules* | Project (Number/Name)<br>3129 / *LCS Mission Package Development* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6.4 Integration, Assembly, Test and Checkout | WR | NSWC PHD : Port Hueneme, CA | 0.978 | 0.225 | Jan 2017 | 0.109 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 1.312 | - |
| 6.4 Integration, Assembly, Test and Checkout | C/CPIF | Booz Allen Hamilton : Washington, DC | 0.000 | 0.525 | Jan 2017 | 0.425 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.950 | - |
| 6.4 Integration, Assembly, Test and Checkout | WR | NAVAIR : Lakehurst | 0.000 | 0.200 | Mar 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.200 | - |
| 4.0 Command, Control, Communication, Computers, Collaboration and Intelligence (C5I) | C/CPFF | AAC : Uniontown, PA | 8.254 | 4.707 | Feb 2017 | 2.302 | Mar 2018 | 2.500 | Jan 2019 | - | | 2.500 | 0.000 | 17.763 | - |
| 4.0 Command, Control, Communication, Computers, Collaboration and Intelligence (C5I) | WR | NAWC TSD : Orlando, FL | 0.750 | 0.000 | | 0.354 | Jan 2018 | 0.550 | Dec 2018 | - | | 0.550 | 0.000 | 1.654 | - |
| 4.0 Command, Control, Communication, Computers, Collaboration and Intelligence (C5I) | C/CPFF | Northrop Grumman : Bethpage, NY | 1.478 | 0.544 | Dec 2016 | 0.578 | Feb 2018 | 0.990 | Jan 2019 | - | | 0.990 | Continuing | Continuing | Continuing |
| 4.0 Command, Control, Communication, Computers, Collaboration and Intelligence (C5I) | WR | NSWC PC : Panama City, FL | 4.322 | 4.425 | Nov 2016 | 4.123 | Dec 2017 | 2.277 | Nov 2018 | - | | 2.277 | Continuing | Continuing | Continuing |
| 4.0 Command, Control, Communication, Computers, Collaboration and Intelligence (C5I) | WR | NUWC NPT : Newport, RI | 1.172 | 0.402 | Dec 2016 | 0.500 | Nov 2017 | 0.550 | Nov 2018 | - | | 0.550 | Continuing | Continuing | Continuing |
| 4.0 Command, Control, Communication, Computers, Collaboration and Intelligence (C5I) | C/CPIF | Booz Allen Hamilton : Washington, DC | 0.000 | 1.121 | Dec 2016 | 0.348 | Dec 2017 | 0.820 | Dec 2018 | - | | 0.820 | 0.000 | 2.289 | - |
| 4.0 Command, Control, Communication, Computers, Collaboration and Intelligence (C5I) | WR | SPAWAR PACIFIC : San Diego, CA | 2.105 | 0.694 | Dec 2016 | 1.150 | Jan 2018 | 0.469 | Nov 2018 | - | | 0.469 | 0.000 | 4.418 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603596N / *(U)LCS Mission Modules* | Project (Number/Name)<br>3129 / *LCS Mission Package Development* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4.0 Command, Control, Communication, Computers, Collaboration and Intelligence (C5I) | WR | NSWC DD : Dahlgren, VA | 1.504 | 0.438 | Nov 2016 | 0.727 | Nov 2017 | 0.743 | Nov 2018 | - | | 0.743 | Continuing | Continuing | Continuing |
| 4.0 Command, Control, Communication, Computers, Collaboration and Intelligence (C5I) | WR | PMW 760 : Various | 0.716 | 0.173 | Jan 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.889 | - |
| 4.0 Command, Control, Communication, Computers, Collaboration and Intelligence (C5I) | C/CPFF | Progeny : Manassas, VA | 1.000 | 0.730 | Mar 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.730 | - |
| 1.0 MCM MP | WR | NSWC PC : Panama City, FL | 33.514 | 23.383 | Nov 2016 | 14.400 | Dec 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| 1.0 MCM MP | Sub Allot | PMS 406 : Various | 27.861 | 11.000 | Mar 2017 | 3.900 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 42.761 | - |
| 1.0 MCM MP | Sub Allot | PMS 495 : Various | 0.000 | 0.000 | | 0.249 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.249 | - |
| 1.0 MCM MP | WR | NSWC PHD : Port Hueneme, CA | 0.000 | 0.000 | | 2.300 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 2.300 | - |
| 1.0 MCM MP | C/CPIF | Booz Allen Hamilton : Washington, DC | 0.000 | 0.000 | | 0.400 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.400 | - |
| 1.0 MCM MP | C/CPFF | Northrop Grumman : Bethpage, NY | 0.745 | 0.544 | Dec 2016 | 0.603 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 1.892 | - |
| 1.0 MCM MP | WR | Various : Various | 0.000 | 1.124 | Mar 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.124 | - |
| 2.0 ASW MP | Sub Allot | PEO IWS5E : Various | 33.620 | 4.870 | Mar 2017 | 2.604 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 41.094 | - |
| 2.0 ASW MP | WR | NUWC NPT : Newport, RI | 16.341 | 7.422 | Dec 2016 | 13.958 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 37.721 | - |
| 2.0 ASW MP | WR | SSC PAC : San Diego, CA | 4.233 | 0.000 | | 0.734 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 4.967 | - |
| 2.0 ASW MP | WR | CDSA Dam Neck : Virginia Beach, VA | 5.112 | 4.775 | Dec 2016 | 1.258 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 11.145 | - |
| 2.0 ASW MP | C/CPFF | Northrop Grumman : Bethpage, NY | 5.147 | 3.417 | Dec 2016 | 2.350 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 10.914 | - |

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| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603596N / *(U)LCS Mission Modules* | Project (Number/Name)<br>3129 / *LCS Mission Package Development* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2.0 ASW MP | WR | PEO IWS 5A : Various | 0.601 | 0.000 | | 8.700 | Mar 2018 | 0.000 | | - | | 0.000 | 0.000 | 9.301 | - |
| 2.0 ASW MP | C/CPFF | SPA : Washington, DC | 1.187 | 0.250 | Jan 2017 | 0.250 | Apr 2018 | 0.000 | | - | | 0.000 | 0.000 | 1.687 | - |
| 2.0 ASW MP | WR | NSWC DD : Dahlgren, VA | 0.446 | 0.000 | | 0.425 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.871 | - |
| 2.0 ASW MP | WR | NUWC KPT : Keyport, WA | 0.595 | 0.000 | | 0.500 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 1.095 | - |
| 2.0 ASW MP | WR | NSWC PHD : Port Hueneme, CA | 0.000 | 0.000 | | 1.550 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 1.550 | - |
| 2.0 ASW MP | C/FPIF | Booz Allen Hamilton : Washington, DC | 0.000 | 0.000 | | 0.500 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.500 | - |
| 2.0 ASW MP | WR | NAWC WD : Point Mugu, CA | 2.030 | 3.000 | Feb 2017 | 0.400 | Mar 2018 | 0.000 | | - | | 0.000 | 0.000 | 5.430 | - |
| 2.0 ASW MP | C/CPFF | Various : Various | 0.000 | 3.307 | Feb 2017 | 0.450 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 3.757 | - |
| 2.0 ASW MP | Sub Allot | Raytheon : Portmouth, RI | 31.368 | 2.500 | Mar 2017 | 16.188 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 50.056 | - |
| 3.0 SUW MP | C/CPFF | JAMS PO : Various | 0.000 | 6.480 | Feb 2017 | 1.500 | Mar 2018 | 0.000 | | - | | 0.000 | 0.000 | 7.980 | - |
| 3.0 SUW MP | WR | NAWC WD : Ridgecrest, CA | 7.826 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 7.826 | - |
| 3.0 SUW MP | C/CPFF | Northrop Grumman : Bethpage, NY | 42.564 | 15.960 | Dec 2016 | 2.000 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 60.524 | - |
| 3.0 SUW MP | WR | NSWC CD : Crane, IN | 0.396 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.396 | - |
| 3.0 SUW MP | WR | NSWC Corona : Corona, CA | 0.495 | 0.250 | Jan 2017 | 0.950 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 1.695 | - |
| 3.0 SUW MP | WR | NSWC DD : Dahlgren, VA | 38.019 | 14.900 | Nov 2016 | 7.397 | Jan 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| 3.0 SUW MP | WR | NSWC PHD : Port Hueneme, CA | 22.637 | 2.000 | Jan 2017 | 5.800 | Nov 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| 3.0 SUW MP | Sub Allot | PEO IWS 3 : Various | 7.319 | 2.500 | Feb 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 9.819 | - |
| | | **Subtotal** | 332.792 | 133.792 | | 106.268 | | 8.899 | | - | | 8.899 | Continuing | Continuing | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
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**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6.5 Training Systems Development | WR | NAWC TSD : Orlando, Fl | 0.000 | 0.555 | Jan 2017 | 0.354 | Oct 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| 6.5 Training Systems Development | WR | NSWC PHD : Port Hueneme, CA | 0.000 | 0.000 | | 0.390 | Oct 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.390 | - |
| 6.5 Training Systems Development | C/CPIF | Booz Allen Hamilton : Washington, DC | 0.000 | 0.000 | | 0.268 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.268 | - |
| 6.5 Training Systems Development | C/CPAF | Northrop Grumman : Bethpage, NY | 0.000 | 0.000 | | 0.575 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.575 | - |
| 6.5 Training Systems Development | Sub Allot | Various : Various | 1.520 | 1.701 | Mar 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.221 | - |
| 6.5 Training Systems Development | WR | JHU/APL : Laurel, MD | 1.479 | 0.000 | Feb 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.479 | - |
| | | **Subtotal** | 2.999 | 2.256 | | 1.587 | | 0.000 | | - | | 0.000 | Continuing | Continuing | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6.3 System Test and Evaluation | WR | NSWC PHD : Port Hueneme, CA | 18.428 | 7.820 | Jan 2017 | 1.715 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 27.963 | - |
| 6.3 System Test and Evaluation | WR | COMOPTEVFOR : Norfolk, VA | 2.994 | 1.300 | Mar 2017 | 0.650 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 4.944 | - |
| 6.3 System Test and Evaluation | WR | NSWC Corona : Corona, Ca | 0.000 | 0.000 | | 0.500 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.500 | - |
| 6.3 System Test and Evaluation | WR | SPAWAR PAC : San Diego, CA | 3.258 | 2.000 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 5.258 | - |
| 6.3 System Test and Evaluation | C/CPIF | Booz Allen Hamilton : Washington, DC | 0.000 | 0.000 | | 0.750 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.750 | - |
| | | **Subtotal** | 24.680 | 11.120 | | 3.615 | | 0.000 | | - | | 0.000 | 0.000 | 39.415 | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603596N / *(U)LCS Mission Modules* | Project (Number/Name)<br>3129 / *LCS Mission Package Development* | |

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6.2 Program Management | C/CPFF | CACI : Fairfax, VA | 7.698 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 7.698 | - |
| 6.2 Program Management | C/CPIF | Booz Allen Hamilton : Washington DC | 0.000 | 1.937 | Nov 2016 | 2.758 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 4.695 | - |
| 6.2 Program Management | FFRDC | Mitre : McLean, VA | 1.379 | 1.300 | Jan 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.679 | - |
| 6.2 Program Management | FFRDC | JHU/APL : Not Specified | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | - |
| 6.2 Program Management | C/CPFF | Northrop Grumman : Bethpage, NY | 2.071 | 1.440 | Dec 2016 | 1.466 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 4.977 | - |
| 6.2 Program Management | C/CPFF | NSWC Crane : Various | 0.000 | 1.750 | Dec 2016 | 1.177 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 2.927 | - |
| | | **Subtotal** | 11.148 | 6.427 | | 5.401 | | 0.000 | | - | | 0.000 | 0.000 | 22.976 | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 371.619 | 153.595 | | 116.871 | | 8.899 | | - | | 8.899 | Continuing | Continuing | N/A |

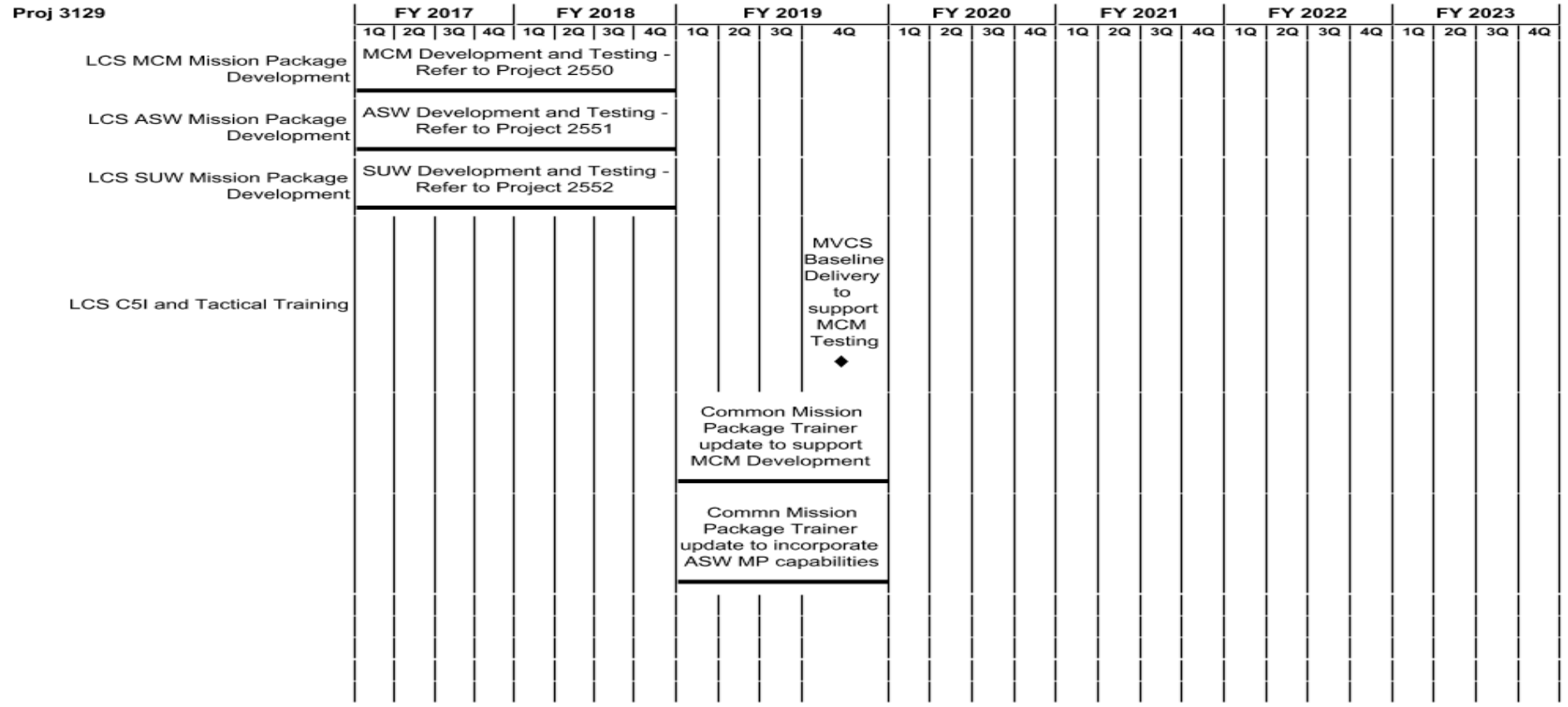
**Remarks**

Beginning in FY 2019, Mission Package funding is realigned into four (4) projects:

2550 Mine Countermeasures (MCM) Mission Package
2551 Anti-Submarine Warfare (ASW) Mission Package
2552 Surface Warfare (SUW) Mission Package
3129 LCS Mission Package Development

Prior to FY 2019 all Mission Package funding was in project 3129.

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>3129 / *LCS Mission Package Development* |




*2019OSD - 0603596N - 3129*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603596N / *(U)LCS Mission Modules* | **Project (Number/Name)**<br>3129 / *LCS Mission Package Development* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3129*** | | | | |
| LCS MCM Mission Package Development: LCS MCM Mission Package Development | 1 | 2017 | 4 | 2018 |
| LCS ASW Mission Package Development: LCS ASW Mission Package Development | 1 | 2017 | 4 | 2018 |
| LCS SUW Mission Package Development: LCS SUW Mission Package Development | 1 | 2017 | 4 | 2018 |
| LCS C5I and Tactical Training: MVCS Baseline Delivery to support MCM MP Testing | 4 | 2019 | 4 | 2019 |
| LCS C5I and Tactical Training: Common Mission Package Trainer update to support MCM Development | 1 | 2019 | 4 | 2019 |
| LCS C5I and Tactical Training: Commn Mission Package Trainer update to incorporate ASW MP capabilities | 1 | 2019 | 4 | 2019 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603597N *I (U)Automated Test and Analysis* |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Program Element | 22.839 | 14.507 | 8.052 | 7.931 | - | 7.931 | 7.926 | 8.083 | 8.248 | 8.416 | Continuing | Continuing |
| 9B88: *Automated Test and Analysis* | 22.839 | 14.507 | 8.052 | 7.931 | - | 7.931 | 7.926 | 8.083 | 8.248 | 8.416 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

The FY 2019 funding request was reduced by $.012 million to reflect the Department of Navy's effort to support the Office of Management and Budget directed reforms for Efficiency and Effectiveness that include a lean, accountable, more efficient government.

In FY 2016, OPNAV N94 took on the challenge to implement a Naval enterprise approach to Automated Test and Analysis (ATA). ATA expands the automated test methods currently in use such as Automated Test and Re-Test (ATRT), adds new methods of testing and use of automated test technologies, and standardizes automated test practices, methods and tools. Examples from FY16 include but are not limited to improvements to Link-16 Non-C2 data collection, essential Mission Planning, Service Oriented Architecture Framework, AEGIS Enterprise Solution Enhancements, Strike Force Interoperability testing and Control System Restoration and Validation. In addition, funding supports the development of enterprise level strategies to apply ATA technology to the software-intensive acquisition programs. The FY 2015 ATRT project was funded on Program Element 0603597N under Project Unit 9B88: "Automated Test and Re-Test". Starting in FY16 and through the out-years, the project is renamed "Automated Test and Analysis" on Program Element 0603597N under Project Unit 9B88.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 0.000 | 8.052 | 8.037 | - | 8.037 |
| Current President's Budget | 14.507 | 8.052 | 7.931 | - | 7.931 |
| Total Adjustments | 14.507 | 0.000 | -0.106 | - | -0.106 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -0.493 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | -0.012 | - | -0.012 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -0.094 | - | -0.094 |
| • Congressional Add Adjustments | 15.000 | - | - | - | - |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603597N / *(U)Automated Test and Analysis* | Project (Number/Name)<br>9B88 / *Automated Test and Analysis* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9B88: *Automated Test and Analysis* | 22.839 | 14.507 | 8.052 | 7.931 | - | 7.931 | 7.926 | 8.083 | 8.248 | 8.416 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

In FY 2016, OPNAV N94 took on the challenge to implement a Naval enterprise approach to Automated Test and Analysis (ATA). ATA expands the automated test methods currently in use such as Automated Test and Re-Test (ATRT), adds new methods of testing and use of automated test technologies, and standardizes automated test practices, methods and tools. Examples from FY16 include but are not limited to improvements to Link-16 Non-C2 data collection, essential Mission Planning, Service Oriented Architecture Framework, AEGIS Enterprise Solution Enhancements, Strike Force Interoperability testing and Control System Restoration and Validation. In addition, funding supports the development of enterprise level strategies to apply ATA technology to the software-intensive acquisition programs. The FY 2015 ATRT project was funded on Program Element 0603597N under Project Unit 9B88: "Automated Test and Re-Test". Starting in FY16 and through the out-years, the project is renamed "Automated Test and Analysis" on Program Element 0603597N under Project Unit 9B88.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Automated Test and Analysis | 14.507 | 8.052 | 7.931 | 0.000 | 7.931 |
| ***Articles:*** | - | - | - | - | - |

***FY 2018 Plans:***

As of June 2017 twenty three proposals were selected based on their ability to best describe technical merit for nine criteria to include productivity, reusability, enhanced coverage, improved fidelity and reduction in Total Ownership Cost by the Executive Steering Group, which includes Senior Executive level representatives from Naval Sea, Naval Air, Space and Naval Warfare, and US Marine Corps Systems Commands.

With a budget of $8M, ATA will be able to provide support to five projects:

o Automated System-of-Systems Operability Testing
o Dev. and Integration of the Enterprise Air Surveillance Radar (EASR)
o Test Automation Framework for the Distributed Common Ground System-Navy (DCGS-N)
o Continuous Automated Services Testing for Joint Mission Planning System
o Joint Tactical Common Operational Picture (COP) Workstation

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603597N / *(U)Automated Test and Analysis* | **Project (Number/Name)**<br>9B88 / *Automated Test and Analysis* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| The ATA Enterprise Program Office will continue with another Naval enterprise-wide data call soliciting automated test tool proposals that will spring-board from some of these efforts and can significantly reduce the time to complete critical testing, increase productivity or system robustness, improve and speed test analysis, and identify commonalities for reuse in Navy acquisition programs for further study in FY 2019. These automated testing projects will reduce errors, increase capabilities and enhance reporting timelines while decreasing Total Ownership Costs for testing critical Navy program initiatives.<br><br>***FY 2019 Base Plans:***<br>Continue to improve on the automated testing and analysis investments to date. Reevaluate selected ATA FY 2018 proposals for improving technologies in FY 2019 and potential collaboration in development. FY 2019 plans will also build upon the results and lessons learned from the FY 2017 and FY 2018 selection process for improved ATA program planning, selection, execution and analysis with the ATA ESG.<br><br>The Navy intends to continue improvements in the quality of end products, reducing the time to plan, evaluate, analyze and/or report testing requirements, identify cost avoidance and determine the reduction in total ownership costs for each ATA project. The Navy will also determine enterprise solutions that significantly reduce test and evaluation man-hours, positively impact fleet training, and improve test plans and procedures.<br><br>The Navy will continue:<br>o Assessing undersea warfare capabilities or fleet modernization and future Navy testing competencies<br>o Evaluating best practices and research capabilities for platform network resiliency and system function validation<br>o Determining common elements through ATA analysis and reporting across multiple SYSCOMs and identifying synergies in development, implementation and training<br>o Augmenting both surface and air Mission Planning for requirements traceability.<br><br>Specific topics include but are not limited to:<br>o Automating Test Framework for Operations Centers or Service Oriented Architectures<br>o Continuing advanced Combat System development/enhancements (SSDS and AEGIS)<br>o Testing of shipboard navigation or mechanical systems and tactical data links analysis (Link-16)<br>o Integrating test and analyses among various Strike Force Interoperability platforms<br>o Implementing test planning/manager improvements | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603597N / *(U)Automated Test and Analysis* | **Project (Number/Name)**<br>9B88 / *Automated Test and Analysis* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| The Navy will conduct another Naval enterprise-wide data call soliciting automated test tool proposals that can significantly reduce the time to complete critical testing, improve and speed test analysis, and identify and correct critical design flaws in testing of Naval acquisition programs for further study in FY 2020.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Reduction due to Process Improvement to Increase Efficiency in Military Spending and Economic Assumptions/ Purchase Inflation Rate Change for PB. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 14.507 | 8.052 | 7.931 | 0.000 | 7.931 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The ATA program solicits automated test tool proposals from all qualified sources that show the potential to significantly reduce the time to complete critical testing, increase productivity or system robustness, improve and speed test analysis, and identify commonalities for reuse in testing of Naval acquisition programs. All valid submitted proposals will be evaluated by an Executive Steering Group (ESG) composed of Senior Executive level representatives from NAVSEA, NAVAIR, SPAWAR and US Marine Corps Systems Commands. Proposals selected by the ESG will be funded for one year, in which time they must demonstrate their ability to significantly reduce the time to complete critical testing, improve and speed test analysis, or find and correct critical design flaws in testing of Naval acquisition programs. Successful funded proposals and artifacts will be advertised and made available across the Naval enterprise for acquisition program consideration, funding, and use.

**E. Performance Metrics**

FY 2017 Program Management was directed to assess ATA projects for:
- Technical improvements/quality of the end-product,
- Use of automation to optimize resource allocation to:
o Increase productivity/robustness
o Plan a test
o Execute a test
o Analyze a test
o Report a test,
- Cost avoidance for the program/project,

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603597N / *(U)Automated Test and Analysis* | **Project (Number/Name)**<br>9B88 / *Automated Test and Analysis* |

- Length of time to see the return on investment.

Progress towards meeting these objectives of ATA efforts is being monitored via the following:

- Monthly Project Manager technical reports, expenditures and risk assessments

o Quarterly Program Reviews

- Bi-Annual ATA Executive Steering Group Meetings

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603597N / *(U)Automated Test and Analysis* | **Project (Number/Name)**<br>9B88 / *Automated Test and Analysis* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Automated Test & Analysis | C/CPFF | Innovative Defense Technologies (IDT) : Ballston, VA | 16.052 | 11.051 | Aug 2017 | 4.751 | Dec 2017 | 4.770 | Dec 2018 | - | | 4.770 | 0.000 | 36.624 | - |
| Automated Test & Analysis | WR | SPAWAR Pacific : San Diego, CA | 2.611 | 1.710 | Jul 2017 | 2.076 | Nov 2017 | 2.019 | Oct 2018 | - | | 2.019 | 0.000 | 8.416 | - |
| Automated Test & Analysis | WR | Marine Corp : Not Specified | 0.833 | 0.000 | | 0.000 | | 0.000 | Nov 2018 | - | | 0.000 | 0.000 | 0.833 | - |
| Automated Test & Analysis | C/CPFF | NAVAIR : Lakehurst NJ | 1.569 | 0.266 | Jul 2017 | 0.465 | Dec 2017 | 0.463 | Nov 2018 | - | | 0.463 | 0.000 | 2.763 | - |
| Automated Test & Analysis | WR | Various NSWCs : NSWC DD | 0.410 | 0.340 | Aug 2017 | 0.100 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.850 | - |
| Automated Test & Analysis | C/CPFF | AFIT : Wright-Patterson AFB, OH | 0.000 | 0.500 | Aug 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.500 | - |
| | | **Subtotal** | 21.475 | 13.867 | | 7.392 | | 7.252 | | - | | 7.252 | 0.000 | 49.986 | N/A |

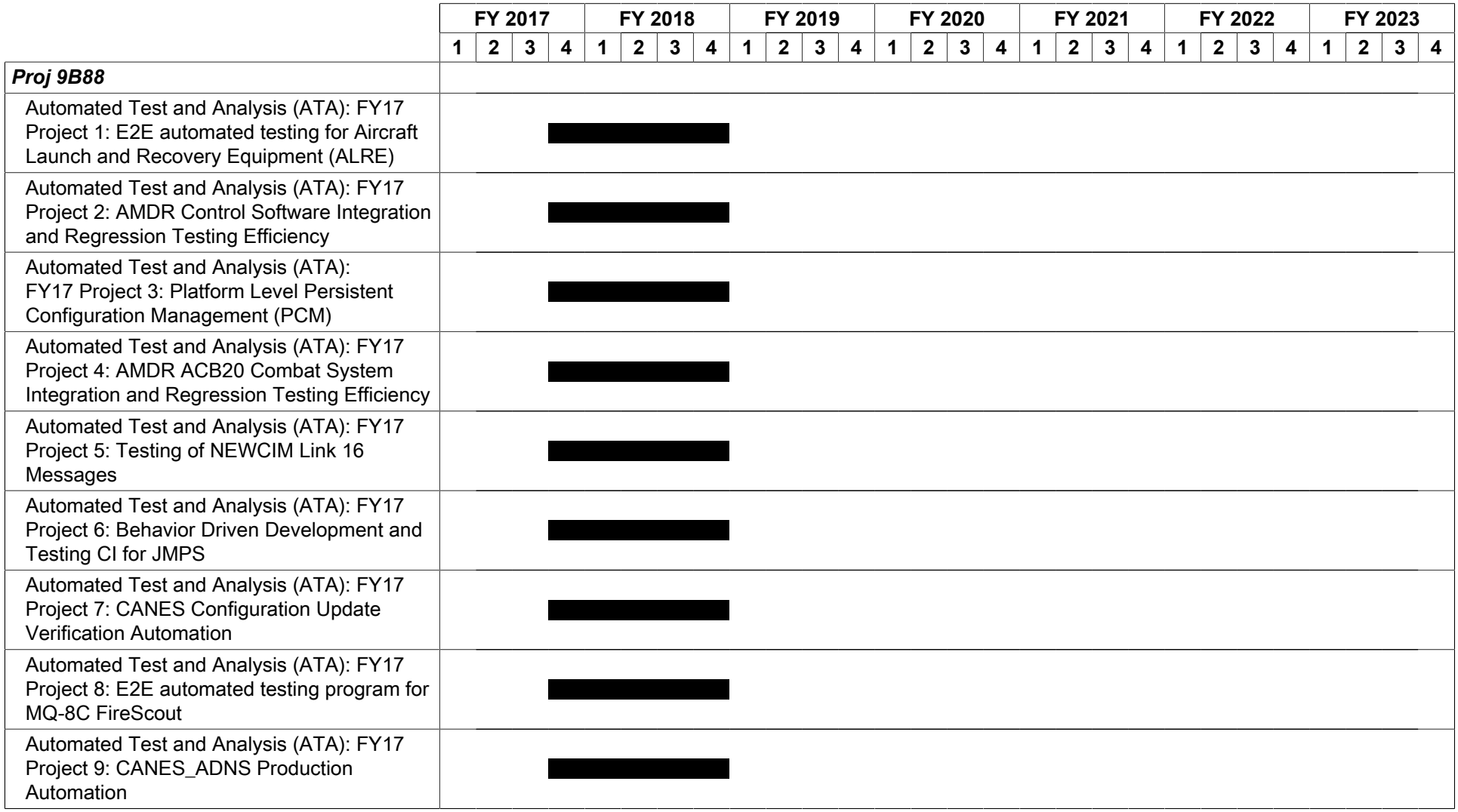
**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Automated Test & Analysis | C/CPFF | Gryphon Technologies : Washington, DC | 0.929 | 0.414 | Sep 2017 | 0.427 | Jan 2018 | 0.439 | Jan 2019 | - | | 0.439 | Continuing | Continuing | Continuing |
| Automated Test & Analysis | C/CPFF | Alion Sciences : McLean, VA | 0.435 | 0.226 | Sep 2017 | 0.233 | Jan 2018 | 0.240 | Jan 2019 | - | | 0.240 | 0.000 | 1.134 | - |
| | | **Subtotal** | 1.364 | 0.640 | | 0.660 | | 0.679 | | - | | 0.679 | Continuing | Continuing | N/A |

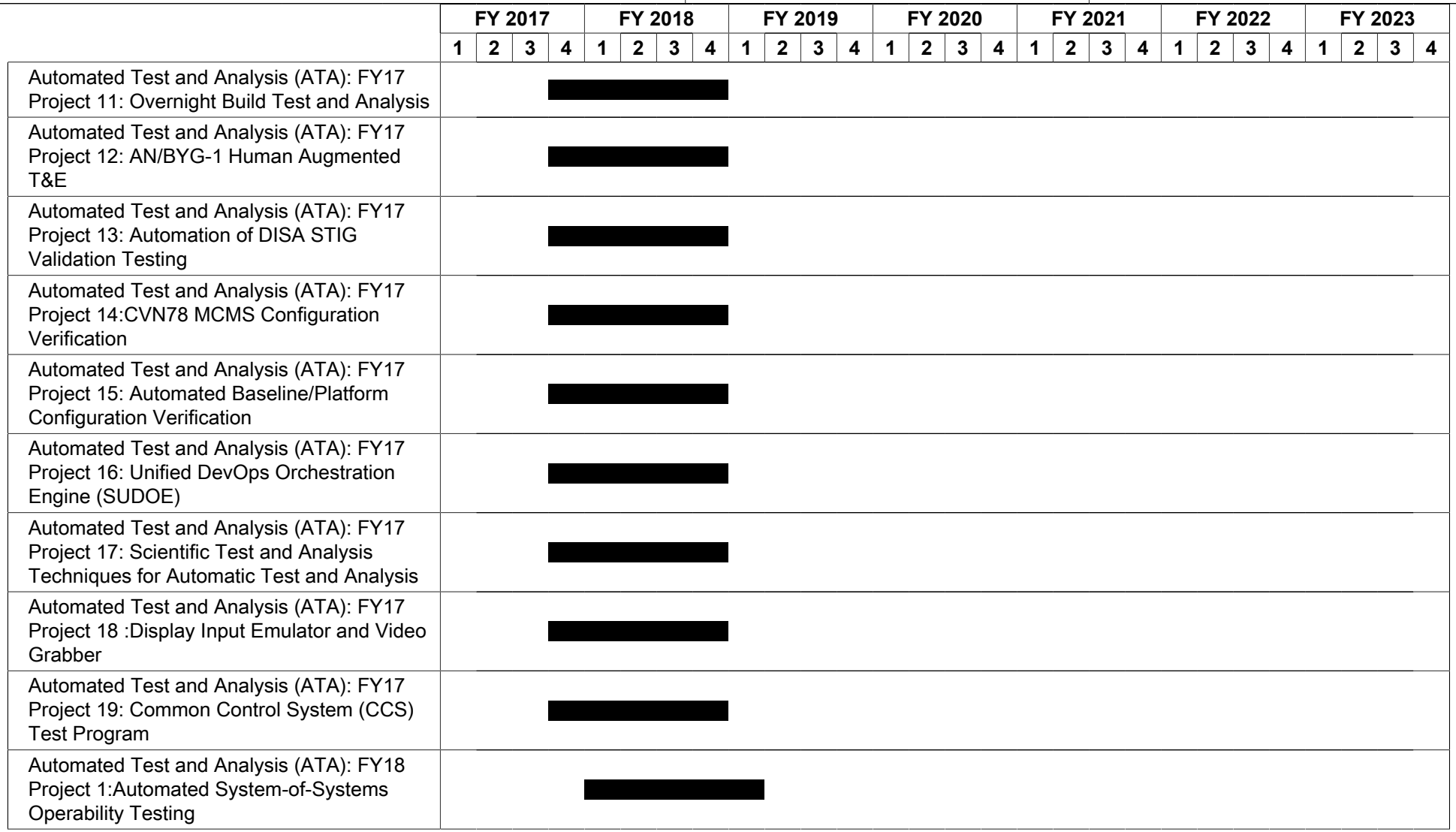
| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 22.839 | 14.507 | | 8.052 | | 7.931 | | - | | 7.931 | Continuing | Continuing | N/A |

**Remarks**

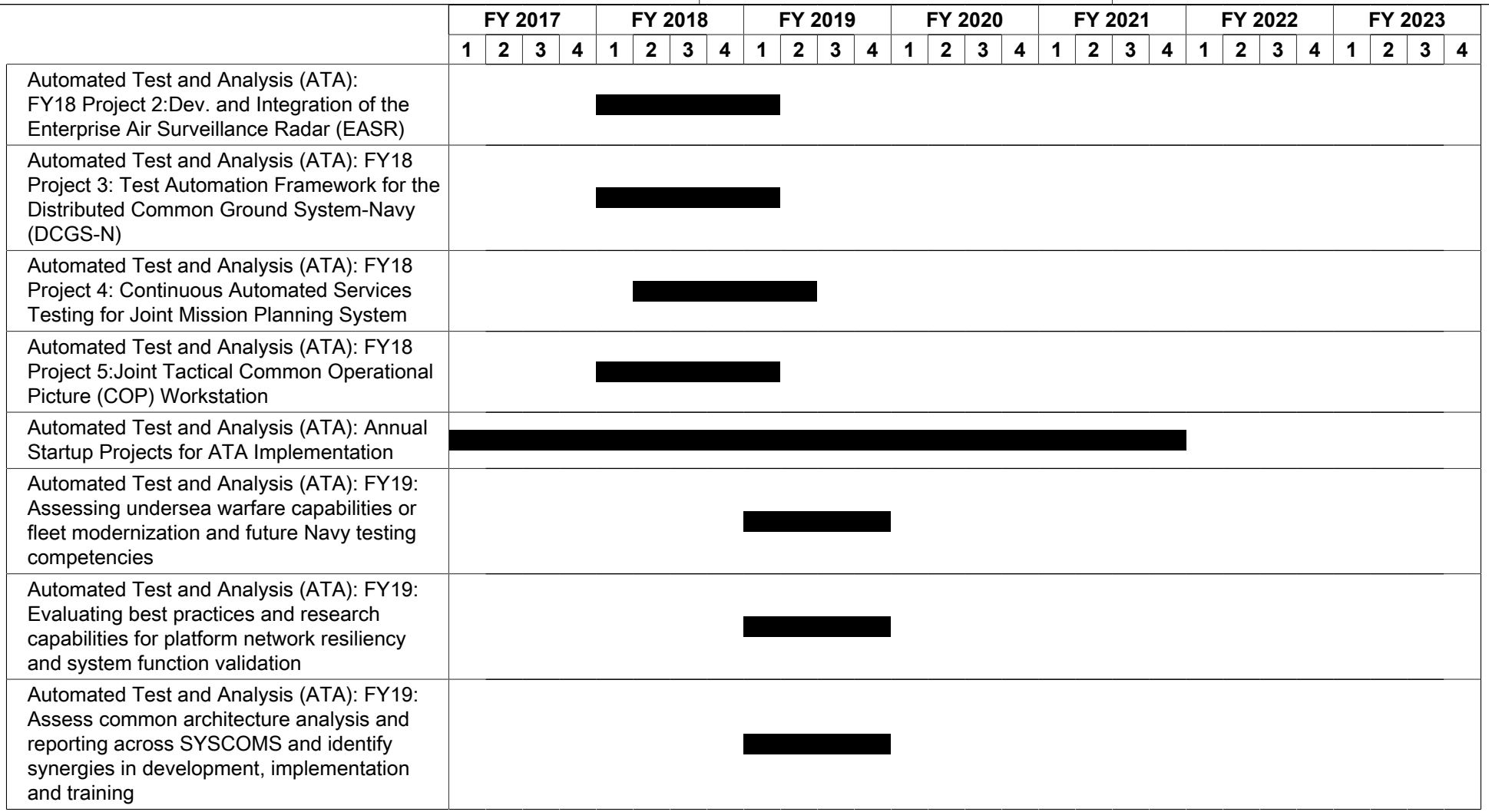
| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603597N / *(U)Automated Test and Analysis* | **Project (Number/Name)**<br>9B88 / *Automated Test and Analysis* |



| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603597N / *(U)Automated Test and Analysis* | **Project (Number/Name)**<br>9B88 / *Automated Test and Analysis* |



| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603597N / *(U)Automated Test and Analysis* | **Project (Number/Name)**<br>9B88 / *Automated Test and Analysis* |



| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603597N / *(U)Automated Test and Analysis* | **Project (Number/Name)**<br>9B88 / *Automated Test and Analysis* |

| | FY 2017 | | | | FY 2018 | | | | FY 2019 | | | | FY 2020 | | | | FY 2021 | | | | FY 2022 | | | | FY 2023 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Automated Test and Analysis (ATA): FY19: Augment both surface and air Mission Planning for requirements traceability | | | | | | | | | [redacted] | | | | | | | | | | | | | | | | | | | |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603597N / *(U)Automated Test and Analysis* | **Project (Number/Name)**<br>9B88 / *Automated Test and Analysis* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 9B88*** | | | | |
| Automated Test and Analysis (ATA): FY17 Project 1: E2E automated testing for Aircraft Launch and Recovery Equipment (ALRE) | 4 | 2017 | 4 | 2018 |
| Automated Test and Analysis (ATA): FY17 Project 2: AMDR Control Software Integration and Regression Testing Efficiency | 4 | 2017 | 4 | 2018 |
| Automated Test and Analysis (ATA): FY17 Project 3: Platform Level Persistent Configuration Management (PCM) | 4 | 2017 | 4 | 2018 |
| Automated Test and Analysis (ATA): FY17 Project 4: AMDR ACB20 Combat System Integration and Regression Testing Efficiency | 4 | 2017 | 4 | 2018 |
| Automated Test and Analysis (ATA): FY17 Project 5: Testing of NEWCIM Link 16 Messages | 4 | 2017 | 4 | 2018 |
| Automated Test and Analysis (ATA): FY17 Project 6: Behavior Driven Development and Testing CI for JMPS | 4 | 2017 | 4 | 2018 |
| Automated Test and Analysis (ATA): FY17 Project 7: CANES Configuration Update Verification Automation | 4 | 2017 | 4 | 2018 |
| Automated Test and Analysis (ATA): FY17 Project 8: E2E automated testing program for MQ-8C FireScout | 4 | 2017 | 4 | 2018 |
| Automated Test and Analysis (ATA): FY17 Project 9: CANES_ADNS Production Automation | 4 | 2017 | 4 | 2018 |
| Automated Test and Analysis (ATA): FY17 Project 11: Overnight Build Test and Analysis | 4 | 2017 | 4 | 2018 |
| Automated Test and Analysis (ATA): FY17 Project 12: AN/BYG-1 Human Augmented T&E | 4 | 2017 | 4 | 2018 |
| Automated Test and Analysis (ATA): FY17 Project 13: Automation of DISA STIG Validation Testing | 4 | 2017 | 4 | 2018 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603597N / *(U)Automated Test and Analysis* | **Project (Number/Name)**<br>9B88 / *Automated Test and Analysis* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Automated Test and Analysis (ATA): FY17 Project 14:CVN78 MCMS Configuration Verification | 4 | 2017 | 4 | 2018 |
| Automated Test and Analysis (ATA): FY17 Project 15: Automated Baseline/Platform Configuration Verification | 4 | 2017 | 4 | 2018 |
| Automated Test and Analysis (ATA): FY17 Project 16: Unified DevOps Orchestration Engine (SUDOE) | 4 | 2017 | 4 | 2018 |
| Automated Test and Analysis (ATA): FY17 Project 17: Scientific Test and Analysis Techniques for Automatic Test and Analysis | 4 | 2017 | 4 | 2018 |
| Automated Test and Analysis (ATA): FY17 Project 18 :Display Input Emulator and Video Grabber | 4 | 2017 | 4 | 2018 |
| Automated Test and Analysis (ATA): FY17 Project 19: Common Control System (CCS) Test Program | 4 | 2017 | 4 | 2018 |
| Automated Test and Analysis (ATA): FY18 Project 1:Automated System-of-Systems Operability Testing | 1 | 2018 | 1 | 2019 |
| Automated Test and Analysis (ATA): FY18 Project 2:Dev. and Integration of the Enterprise Air Surveillance Radar (EASR) | 1 | 2018 | 1 | 2019 |
| Automated Test and Analysis (ATA): FY18 Project 3: Test Automation Framework for the Distributed Common Ground System-Navy (DCGS-N) | 1 | 2018 | 1 | 2019 |
| Automated Test and Analysis (ATA): FY18 Project 4: Continuous Automated Services Testing for Joint Mission Planning System | 2 | 2018 | 2 | 2019 |
| Automated Test and Analysis (ATA): FY18 Project 5:Joint Tactical Common Operational Picture (COP) Workstation | 1 | 2018 | 1 | 2019 |
| Automated Test and Analysis (ATA): Annual Startup Projects for ATA Implementation | 1 | 2017 | 4 | 2021 |
| Automated Test and Analysis (ATA): FY19: Assessing undersea warfare capabilities or fleet modernization and future Navy testing competencies | 1 | 2019 | 4 | 2019 |
| Automated Test and Analysis (ATA): FY19: Evaluating best practices and research capabilities for platform network resiliency and system function validation | 1 | 2019 | 4 | 2019 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603597N / *(U)Automated Test and Analysis* | **Project (Number/Name)**<br>9B88 / *Automated Test and Analysis* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Automated Test and Analysis (ATA): FY19: Assess common architecture analysis and reporting across SYSCOMS and identify synergies in development, implementation and training | 1 | 2019 | 4 | 2019 |
| Automated Test and Analysis (ATA): FY19: Augment both surface and air Mission Planning for requirements traceability | 1 | 2019 | 4 | 2019 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603599N *I (U)Frigate Development* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 18.910 | 83.080 | 143.450 | 134.772 | - | 134.772 | 75.353 | 77.639 | 70.469 | 72.022 | Continuing | Continuing |
| 3086: *Frigate* | 18.910 | 83.080 | 143.450 | 134.772 | - | 134.772 | 75.353 | 77.639 | 70.469 | 72.022 | Continuing | Continuing |

**Program MDAP/MAIS Code:**
**Project MDAP/MAIS Code(s):** 374

**A. Mission Description and Budget Item Justification**

The FY 2019 funding request was reduced by $4.608 million to account for the availability of prior year execution balances.

In FY14, the Navy established the requirements for a lethal and survivable small surface combatant ship (later redesignated as Frigate (FF)), above that of Littoral Combat Ship (LCS) to meet future missions. Based upon the Navy's 2016 Force Structure Assessment resulting in validation of the need for 52 small surface combatants and the need to address increasingly complex threats in the global maritime environment, the Navy reassessed the capabilities required to ensure the Frigate paces future threats. With FFG(X), the Navy desires to maximize the small surface combatant capabilities in the anti-surface warfare (SUW), anti-submarine warfare (ASW), electromagnetic maneuver warfare (EMW), and air warfare (AW) mission areas, while keeping the ship affordable and as a part of a "high-low" mix of surface ships. The updated assessment was completed to support establishment of top-level FFG(X) requirements in Summer 2017 and resulted in a Navy-approved Capability Development Document (CDD).

The FFG(X) program will continue to refine the cost estimates to support a FY20 Detail Design and Construction (DD&C) contract award. Based on the updated FFG(X) requirements, FY17 focused on efforts for the system specification (SPEC) development and on conceptual design contract development. FY18 funding continues to refine the system SPEC and to award conceptual design contracts to multiple vendors. Additionally, funds will be used to continue maturing the FFG(X) Government Furnished Equipment (GFE) baseline, continue Combat Management System (CMS) design development, coding, and test, acquisition documentation development, C4I systems development and continuing system engineering efforts to ensure mature Government Furnished Information (GFI) deliveries. Efforts in FY19 reflect the continuation of conceptual design tasking, which will support the FY19 DD&C Request for Proposal (RFP) release and to continue development and maturation of CMS, Government Furnished Equipment (GFE), C4I, and system engineering efforts. FY20 funding has been realigned to SCN 2127 to support systems engineering, cost estimating, and ship design management. The shift to SCN marks the completion of the conceptual design phase.

FY19 RDT&E funding is critical to an effective and timely completion of contract design and specification development, which is needed to better inform and develop the Detailed Design and Construction RFP. Conceptual Design before the competitive Detail Design and Construction award allows the maturation of multiple designs to give the Navy a better understanding of cost and capability drivers across the various design options. This due diligence will provide the opportunity for the government to identify and implement cost reduction opportunities and inform the final specifications that will deliver the required capability at an affordable price and achieve the best value solution.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | Date: February 2018 |
|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | R-1 Program Element (Number/Name)<br>PE 0603599N *I (U)Frigate Development* | | |
| **B. Program Change Summary ($ in Millions)** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** |
| Previous President's Budget | 84.900 | 143.450 | 141.599 | - | 141.599 |
| Current President's Budget | 83.080 | 143.450 | 134.772 | - | 134.772 |
| Total Adjustments | -1.820 | 0.000 | -6.827 | - | -6.827 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -1.820 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | -5.108 | - | -5.108 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -1.719 | - | -1.719 |

**Change Summary Explanation**

The FY 2019 funding request was reduced by $4.608 million to account for the availability of prior year execution balances.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | | | | | R-1 Program Element (Number/Name)<br>PE 0603599N / *(U)Frigate Development* | | | | Project (Number/Name)<br>3086 / *Frigate* | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| 3086: *Frigate* | 18.910 | 83.080 | 143.450 | 134.772 | - | 134.772 | 75.353 | 77.639 | 70.469 | 72.022 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Project MDAP/MAIS Code:** 374

**A. Mission Description and Budget Item Justification**

Frigate (FFG(X)) efforts are composed of the design and development for a more lethal and survivable multi-mission warship focused on anti-surface warfare and anti-submarine warfare capabilities (SUW/ASW), local air defense and enhanced survivability features. FFG(X) design modifications for added capability over LCS include an over-the-horizon (OTH) surface-to-surface missile system, upgraded air defense weapons and sensors, advanced electronic warfare system and improved decoys, local air defense, and enhanced survivability features. This effort will encompass design, development, and technical issue resolution to support design maturity for FFG(X) FY20 contract award. Certification and testing efforts are also required to support the FFG(X) delivery, operations, and introduction to the fleet.

The FFG(X) design and development phases include platform design, development and risk reduction; combat system element integration; total ship system engineering and integration; combat systems and warfare systems certification; and planning and conduct of system testing. These efforts include procurement of combat and warfare system elements and/or simulators to support production representative testing in support of design, development, and certification efforts and ordnance in support of testing. Primary design modifications over the LCS will include an over-the-horizon (OTH) surface-to-surface missile system, upgraded air defense weapons and sensors, advanced electronic warfare system and improved decoys, local air defense, and enhanced survivability features.

This funding will also include efforts and activities required for formal Developmental and Operational testing of the FFG(X). Test and Evaluation (T&E) will concentrate on verifying integration and interoperability of employed technologies and systems in the FFG(X) design to achieve the mission capabilities and performance requirements as defined in the FFG(X) Capabilities Development Document (CDD). T&E functions will include the evaluation of Critical Technical Parameters (CTP), Measures of Effectiveness (MOE), Measures of Suitability (MOS), and Key Performance Parameters (KPP).

The FY 2019 funding request was reduced by $4.608 million to account for the availability of prior year execution balances.

| **B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** |
|---|---|---|---|---|---|
| ***Title:*** Ship Systems / C4I / Warfare Systems Engineering | 80.567 | 142.343 | 131.567 | 0.000 | 131.567 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** The Frigate (FFG(X)) is a multi-mission ship that focuses on anti-surface warfare, anti-submarine warfare capabilities and local air defense. Specific capabilities include over-the-horizon (OTH) surface-to-surface missile system, upgraded Air Defense weapons and sensors, advanced electronic warfare system and improved decoys, horizon surface-to-surface missile system, variable depth sonar, towed array, torpedo defense, and enhanced survivability features. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603599N / *(U)Frigate Development* | **Project (Number/Name)**<br>3086 / *Frigate* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***FY 2018 Plans:***<br>Funding was realigned from Test & Evaluation to Ship Systems Engineering due to program restructure which delayed testing efforts one year. Additional ship systems engineering effort is in the added conceptual design efforts are captured in the FFG(X) conceptual design phase.<br><br>Ship Systems Engineering<br>Continue system engineering efforts related to naval architecture, machinery engineering and topside design analysis. Emphasis will be placed on the structural and stability disciplines, and incorporation of lethality and survivability enhancements to include the flow-down impacts to the supporting machinery and electrical systems in support of system Spec and evaluation of contractor designs. Continue development and refinement of the System SPEC. Begin contractor-led conceptual designs to support FY20 DD&C competition. Begin development of the Milestone B documentation. Continue efforts to support and verify cost estimates and the Independent Cost Estimate (ICE)/ Component Cost Position (CCP).<br><br>C4I / Warfare Systems Engineering<br>Continue system engineering efforts related to C4I and warfare systems specifications. Continue OTH systems engineering and testing efforts for integration of OTH missile. Continue CMS development efforts to ensure full ship integration aligns with platform design efforts and to integrate additional FFG(X) required capabilities. Execute CS Software efforts to support a delta System Requirements Review (SRR), which incorporates additional FFG(X) capabilities. Integrate other CS and C4I elements into total ship design. Implement additional cyber security/information assurance (IA) measures on the warfare system and C4I suite to pace the current and future threats. Begin development of the Milestone B documentation. Continue efforts to support and verify cost estimates and the Independent Cost Estimate (ICE)/ Component Cost Position (CCP). | | | | | |
| ***FY 2019 Base Plans:***<br>Ship Systems Engineering<br>Continue system engineering efforts related to naval architecture, machinery engineering and topside design analysis. Emphasis will be placed on the structural and stability disciplines, and incorporation of lethality and survivability enhancements to include the flow-down impacts to the supporting machinery and electrical systems. Completion of the Final System SPEC to support DD&C release. Completion of contractor-led conceptual designs to support FY 2020 competition. Continue development of the documentation to support Milestone B in FY20. Continue efforts to support and verify updated cost estimates and the Independent Cost Estimate (ICE)/ Component Cost Position (CCP). Release of DD&C RFP. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603599N / *(U)Frigate Development* | **Project (Number/Name)**<br>3086 / *Frigate* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| C4I / Warfare Systems Engineering<br>Continue system engineering efforts related to C4I and warfare systems specifications. Continue OTH systems engineering and testing efforts for integration of OTH missile. Continue CMS development efforts to ensure full ship integration aligns with total ship design efforts and integrate additional FFG(X) required capabilities. Execute CS Software delta System Functional Review (SFR). Integrate other CS and C4I elements into total ship design. Implement additional cyber security/information assurance (IA) measures on the warfare system and C4I suite to pace the current and future threats. Continue development of the Milestone B documentation. Continue efforts to support and verify cost estimates and the Independent Cost Estimate (ICE)/ Component Cost Position (CCP).<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Decreases in funding from FY 2018 to FY 2019 reflect the conclusion of system specification and the reduction of $4.608 million to account for the availability of prior year execution balances. | | | | | |
| ***Title:*** Test & Evaluation | 2.513 | 1.107 | 3.205 | 0.000 | 3.205 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Conduct FFG(X) test planning in support of Developmental Testing and Operational Testing (DT/ OT), including Live Fire Test and Evaluation (LFT&E), and procurement of T&E Ordnance. Plan for and execute DT and C4I integration & test, cyber test and certification, warfare system integration & test and certification, aviation (manned and unmanned) integration & test and certification. Late FY17 efforts were shifted to the FFG(X) test planning leveraging the FF test planning efforts.<br>***FY 2018 Plans:***<br>Leverage FF Test and Evaluation Master Plan (TEMP) updates to build the FFG(X) TEMP. Begin testing integrated product teams (IPTs) across DoD stakeholder organizations (WIPTs) to coordinate content and refinements with stakeholder organizations. Develop LFT&E Management Plan in conjunction with DOT&E and apply for LFT&E waiver. Compile final testing analysis of FF structures and hull model test and assess potential uses for modeling and simulation in support of FFG(X). Continue to develop plan to support future updates required for land-based SIM/STIM modeling and test requirements for the integration and test of the FFG(X) platform. Continue development of test sequence network and combat system test efforts to support contracting efforts. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603599N / *(U)Frigate Development* | **Project (Number/Name)**<br>3086 / *Frigate* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Funding in FY18 was realigned from Test & Evaluation to Ship Systems Engineering due to program restructure which delayed testing efforts one year.<br>***FY 2019 Base Plans:***<br>Continue FFG(X) Test and Evaluation Master Plan (TEMP) updates and continue WIPTs required to achieve TEMP approval. Support future updates required for land-based SIM/STIM test requirements for the integration and test of the FFG(X) platform. Begin execution of land-based SIM/STIM modeling and test efforts. Acquire LFT&E Waiver Approval to support MS B.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Increases in funding from FY 2018 to FY 2019 reflect the beginning of SIM/STIM modeling and testing efforts that were delayed due to the program restructure in FY 2017. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 83.080 | 143.450 | 134.772 | 0.000 | 134.772 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • SCN/2127: *Littoral Combat Ship (LCS)* | 1,649.692 | 1,162.936 | 749.428 | - | 749.428 | 1,228.176 | 849.087 | 1,791.867 | 1,791.996 | 3,768.664 | 24,792.911 |

**Remarks**

In FY 2017 - 2019, the SCN represents LCS procurement. Beginning in FY 2020, the SCN represents FFG(X) procurement.

**D. Acquisition Strategy**

The FFG(X) acquisition strategy is currently being developed to pursue a full and open competitive contract award in FY20.

**E. Performance Metrics**

T&E functions will include the evaluation of Critical Technical Parameters (CTP), Measures of Effectiveness (MOE), Measures of Suitability (MOS), and Key Performance Parameters (KPP).

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603599N / *(U)Frigate Development* | Project (Number/Name)<br>3086 / *Frigate* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conceptual Design Contracts | TBD | Various : Various | 0.000 | 2.500 | Sep 2017 | 50.000 | Feb 2018 | 42.500 | Feb 2019 | - | | 42.500 | 0.000 | 95.000 | - |
| System SPEC Development | WR | Government Activites : Various | 0.000 | 5.580 | Mar 2017 | 1.500 | Jan 2018 | 0.375 | Jan 2019 | - | | 0.375 | Continuing | Continuing | Continuing |
| System SPEC Development | C/CPAF | Various Contractors : Various | 0.000 | 2.500 | Mar 2017 | 2.500 | Jan 2018 | 0.875 | Jan 2019 | - | | 0.875 | Continuing | Continuing | Continuing |
| Ship Design Modifications | C/CPAF | Lockheed Martin : Various | 2.755 | 9.015 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 11.770 | - |
| Ship Design Modifications | C/CPAF | Austal : Mobile, AL | 2.726 | 5.925 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 8.651 | - |
| Over the Horizon (OTH) Missile Integration | WR | NAWC, China Lake : China Lake, CA | 0.067 | 0.585 | Feb 2017 | 0.500 | Feb 2018 | 0.510 | Feb 2019 | - | | 0.510 | Continuing | Continuing | Continuing |
| Over the Horizon (OTH) Missile Integration | WR | Various : Various | 0.202 | 1.211 | Feb 2017 | 1.200 | Feb 2018 | 1.274 | Feb 2019 | - | | 1.274 | Continuing | Continuing | Continuing |
| C4I Development | WR | PEO C4I : San Diego, CA | 0.250 | 0.162 | Nov 2016 | 0.578 | Nov 2017 | 0.733 | Nov 2018 | - | | 0.733 | Continuing | Continuing | Continuing |
| C4I Development | WR | SPAWAR : San Diego, CA | 0.828 | 2.688 | Nov 2016 | 2.941 | Nov 2017 | 3.094 | Nov 2018 | - | | 3.094 | Continuing | Continuing | Continuing |
| C4I Development | WR | SPAWAR : Charleston, SC | 0.919 | 0.988 | Nov 2016 | 1.950 | Nov 2017 | 1.784 | Nov 2018 | - | | 1.784 | Continuing | Continuing | Continuing |
| Common Combat Management System Development (CMS) | C/CPIF | Lockheed Martin : Various | 1.052 | 14.700 | Jan 2017 | 25.980 | Jan 2018 | 28.057 | Jan 2019 | - | | 28.057 | Continuing | Continuing | Continuing |
| Common Combat Management System Development (CMS) | C/CPAF | Austal : Mobile, AL | 0.250 | 0.250 | Jan 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.500 | - |
| Common Combat Management System Development (CMS) | WR | Government Activites : Various | 0.117 | 2.006 | Nov 2016 | 4.148 | Nov 2017 | 3.727 | Nov 2018 | - | | 3.727 | Continuing | Continuing | Continuing |
| Warfare Systems Development | WR | NUWC, Newport : Newport, RI | 0.150 | 1.350 | Nov 2016 | 3.080 | Nov 2017 | 3.129 | Nov 2018 | - | | 3.129 | Continuing | Continuing | Continuing |
| Warfare Systems Development | WR | NSWC, DD : Dahlgren, VA | 1.040 | 3.949 | Nov 2016 | 5.571 | Nov 2017 | 5.952 | Nov 2018 | - | | 5.952 | Continuing | Continuing | Continuing |
| Warfare Systems Development | WR | NSWC, CD : Carderock, MD | 0.115 | 0.330 | Nov 2016 | 0.916 | Nov 2017 | 0.931 | Nov 2018 | - | | 0.931 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603599N / *(U)Frigate Development* | Project (Number/Name)<br>3086 / *Frigate* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Warfare Systems Development | C/CPAF | Lockheed Martin : Various | 0.100 | 1.752 | Dec 2016 | 0.660 | Dec 2017 | 1.530 | Dec 2018 | - | | 1.530 | Continuing | Continuing | Continuing |
| Warfare Systems Development | Various | Various : Various | 0.600 | 3.492 | Nov 2016 | 2.743 | Nov 2017 | 3.358 | Nov 2018 | - | | 3.358 | Continuing | Continuing | Continuing |
| Warfare Systems Development | WR | Government Activites : Various | 0.000 | 1.438 | Nov 2016 | 2.183 | Nov 2017 | 1.699 | Nov 2018 | - | | 1.699 | 0.000 | 5.320 | - |
| Aviation Integration Development | WR | NAWC, AD : Patuxent River, MD | 0.263 | 1.133 | Nov 2016 | 1.003 | Nov 2017 | 0.994 | Nov 2018 | - | | 0.994 | Continuing | Continuing | Continuing |
| Aviation Integration Development | WR | NSWC, DD : Dahlgren, VA | 0.000 | 0.116 | Dec 2016 | 0.226 | Dec 2017 | 0.219 | Dec 2018 | - | | 0.219 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 11.434 | 61.670 | | 107.679 | | 100.741 | | - | | 100.741 | Continuing | Continuing | N/A |

**Remarks**

Ship Design Modification efforts were stopped and new conceptual design efforts and system SPECs started.

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Government Engineering Support | WR | NSWC, CD : Carderock, MD | 0.261 | 4.783 | Nov 2016 | 6.888 | Nov 2017 | 6.379 | Nov 2018 | - | | 6.379 | Continuing | Continuing | Continuing |
| Government Engineering Support | WR | NSWC, PD : Philadelphia, PA | 0.185 | 2.491 | Nov 2016 | 3.392 | Nov 2017 | 2.848 | Nov 2018 | - | | 2.848 | Continuing | Continuing | Continuing |
| Government Engineering Support | WR | NSWC, DD : Dahlgren, VA | 0.385 | 2.457 | Nov 2016 | 2.644 | Nov 2017 | 2.385 | Nov 2018 | - | | 2.385 | Continuing | Continuing | Continuing |
| Government Engineering Support | WR | NSWC, PHD : Port Hueneme, CA | 0.003 | 0.674 | Nov 2016 | 0.674 | Nov 2017 | 0.551 | Nov 2018 | - | | 0.551 | Continuing | Continuing | Continuing |
| Government Engineering Support | WR | Government Activites : Various | 0.040 | 0.276 | Nov 2016 | 1.879 | Nov 2017 | 1.716 | Nov 2018 | - | | 1.716 | Continuing | Continuing | Continuing |
| Contractor Engineering Support | C/CPAF | Booz Allen Hamilton : McLean, VA | 0.545 | 0.511 | Feb 2017 | 0.741 | Feb 2018 | 0.656 | Feb 2019 | - | | 0.656 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603599N / *(U)Frigate Development* | Project (Number/Name)<br>3086 / *Frigate* | |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Contractor Engineering Support | C/CPAF | CACI : Arlington, VA | 0.037 | 0.438 | Feb 2017 | 0.447 | Nov 2017 | 0.340 | Nov 2018 | - | | 0.340 | Continuing | Continuing | Continuing |
| Contractor Engineering Support | C/CPAF | Alion : Arlington, VA | 0.486 | 1.556 | Feb 2017 | 1.345 | Feb 2018 | 1.256 | Feb 2019 | - | | 1.256 | Continuing | Continuing | Continuing |
| Contractor Engineering Support | C/CPAF | Various : Various | 0.875 | 1.085 | Jan 2017 | 4.646 | Jan 2018 | 4.520 | Jan 2019 | - | | 4.520 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 2.817 | 14.271 | | 22.656 | | 20.651 | | - | | 20.651 | Continuing | Continuing | N/A |

**Remarks**

Increase funding for FY 18 Engineering Support are due to conceptual design effort, GFI/GFE development, and Combat System development.

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model/ Hull Form Testing | WR | NSWC, CD : Carderock, MD | 0.320 | 2.093 | Nov 2016 | 0.257 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 2.670 | - |
| Test and Evaluation Master Plan (TEMP) Development | C/CPAF | Alion : Arlington, VA | 0.130 | 0.420 | Dec 2016 | 0.400 | Dec 2017 | 0.405 | Dec 2018 | - | | 0.405 | Continuing | Continuing | Continuing |
| Test and Evaluation Master Plan (TEMP) Development | WR | Government Activites : Various | 0.000 | 0.000 | | 0.450 | Dec 2017 | 1.000 | Dec 2018 | - | | 1.000 | Continuing | Continuing | Continuing |
| Land Based Integration & Test | TBD | TBD : TBD | 0.000 | 0.000 | | 0.000 | | 1.800 | Nov 2018 | - | | 1.800 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.450 | 2.513 | | 1.107 | | 3.205 | | - | | 3.205 | Continuing | Continuing | N/A |

**Remarks**

Land Based Testing efforts were delayed a year due to program restructure.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603599N / *(U)Frigate Development* | Project (Number/Name)<br>3086 / *Frigate* | |

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management Support | C/CPAF | Alion : Arlington, VA | 0.786 | 1.373 | Dec 2016 | 1.445 | Dec 2017 | 1.246 | Dec 2018 | - | | 1.246 | Continuing | Continuing | Continuing |
| Program Management Support | WR | Various : Various | 3.423 | 3.253 | Dec 2016 | 10.563 | Dec 2017 | 8.929 | Dec 2018 | - | | 8.929 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 4.209 | 4.626 | | 12.008 | | 10.175 | | - | | 10.175 | Continuing | Continuing | N/A |

**Remarks**

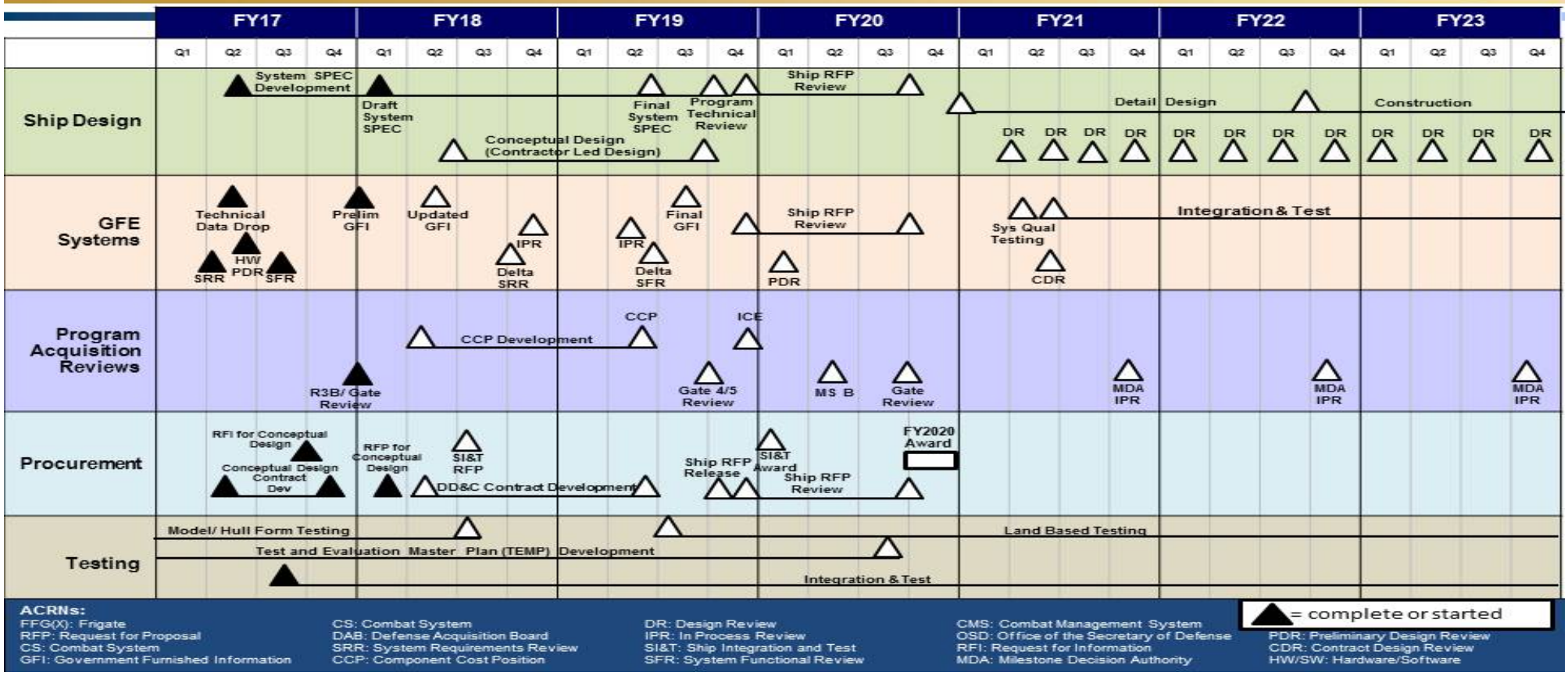
Program Management Support includes Program Office support, Cost Estimation support, Acquisition Documentation Support, Design Site funds, and Program Office travel.

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 18.910 | 83.080 | | 143.450 | | 134.772 | | - | | 134.772 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603599N / *(U)Frigate Development* | **Project (Number/Name)**<br>3086 / *Frigate* |

# FFG(X) Program Schedule



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603599N / *(U)Frigate Development* | **Project (Number/Name)**<br>3086 / *Frigate* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3086*** | | | | |
| SPEC Development | 2 | 2017 | 3 | 2019 |
| Test and Evaluation Master Plan (TEMP) Development | 1 | 2017 | 3 | 2020 |
| Model / Hull Form Testing | 1 | 2017 | 3 | 2018 |
| Technical Data Package Data Drop | 2 | 2017 | 2 | 2017 |
| CS Software System Requirements Review (SRR) | 2 | 2017 | 2 | 2017 |
| Integration and Test | 3 | 2017 | 4 | 2023 |
| CS Software System Functional Review (SFR) | 3 | 2017 | 3 | 2017 |
| Component Cost Position (CCP) Development | 2 | 2018 | 2 | 2019 |
| In Process Review (IPR) #1 | 4 | 2018 | 4 | 2018 |
| Draft System SPEC Approval | 1 | 2018 | 1 | 2018 |
| RFP for Conceptual Design | 1 | 2018 | 1 | 2018 |
| DD&C Contract Development | 2 | 2018 | 2 | 2019 |
| CS Software Delta System Requirements Review (SRR) | 4 | 2018 | 4 | 2018 |
| In Process Review (IPR) #2 | 2 | 2019 | 2 | 2019 |
| Final System SPEC Approval | 3 | 2019 | 3 | 2019 |
| Program Technical Review | 4 | 2019 | 4 | 2019 |
| Production RFP Released | 4 | 2019 | 4 | 2019 |
| Land Based Testing | 3 | 2019 | 4 | 2023 |
| CS Software Delta System Functional Review (SFR) | 2 | 2019 | 2 | 2019 |
| CS Software Preliminary Design Review (PDR) | 1 | 2020 | 1 | 2020 |
| RFP Review and Downselect | 4 | 2019 | 3 | 2020 |
| Detail Design | 1 | 2021 | 4 | 2023 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603599N / *(U)Frigate Development* | **Project (Number/Name)**<br>3086 / *Frigate* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| CS Integration and Test | 2 | 2021 | 4 | 2023 |
| System Qualification Testing | 2 | 2021 | 2 | 2021 |
| CS Software Critical Design Review (CDR) | 2 | 2021 | 2 | 2021 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603609N *I Conventional Munitions* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 230.411 | 8.342 | 8.909 | 9.307 | - | 9.307 | 9.988 | 10.761 | 8.768 | 8.941 | Continuing | Continuing |
| 0363: *Insensitive Munitions Adv. Development* | 230.411 | 8.342 | 8.909 | 8.414 | - | 8.414 | 8.434 | 8.628 | 8.768 | 8.941 | Continuing | Continuing |
| 3436: *AN/BST-1 Buoy Component Re-Design* | 0.000 | 0.000 | 0.000 | 0.893 | - | 0.893 | 1.554 | 2.133 | 0.000 | 0.000 | 0.000 | 4.580 |

**A. Mission Description and Budget Item Justification**

Proj 0363- Most Navy munitions react violently when exposed to unplanned stimuli such as fire, shock and bullet or fragment impact, thus presenting a great hazard to ships, aircraft, and personnel. The Insensitive Munitions Advanced Development (IMAD) program will provide, validate, and transition technology to all new weapon developments and priority weapon systems and enable production of munitions insensitive to these stimuli with no reduction in combat performance. Insensitive Munitions (IM) is the Navy's focused effort on propellants, propulsion units, explosives, warheads, fuses, and pyrotechnics to reduce the severity of cook-off and bullet/ fragment impact reactions, minimizing the probability for sympathetic detonation, both in normal storage and in use, increasing ship and platform survivability and satisfying performance and readiness requirements.

Proj 3436- The AN/BST-1 Submarine Emergency Communication Transmitter informs Navy leadership when a ballistic missile submarine is in extremis. When activated, a buoy is released from the submarine, floats to the surface and transmits an emergency signal. The energetic components in the system release the buoy from the submarine, separate protective covers and actuate an antenna for communication. The AN/BST-1 Buoy energetic component re-design will replace two antenna related explosive components that utilize explosive formulations that are no longer produced due to environmental impact. The re-design will support future procurements for OHIO and COLUMBIA class deployments. The energetic component re-design includes design, prototyping, design verification testing, environmental qualification, hazard classification, insensitive munitions and developmental testing. The two re-designed energetic components will be qualified for USN use at the conclusion of the program.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | Date: February 2018 |
|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | R-1 Program Element (Number/Name)<br>PE 0603609N *I Conventional Munitions* | | |
| **B. Program Change Summary ($ in Millions)** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** |
| Previous President's Budget | 8.342 | 8.909 | 8.561 | - | 8.561 |
| Current President's Budget | 8.342 | 8.909 | 9.307 | - | 9.307 |
| Total Adjustments | 0.000 | 0.000 | 0.746 | - | 0.746 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | - | - | | | |
| • Program Adjustments | 0.000 | 0.000 | 0.900 | - | 0.900 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -0.154 | - | -0.154 |

**Change Summary Explanation**

The FY 2019 funding request was reduced by $0.051 million to reflect the Department of Navy's effort to support the Office of Management and Budget directed reforms for Efficiency and Effectiveness that include a lean, accountable, more efficient government.

FY19-FY23 $4.6M increase due to the addition of Proj 3436 AN/BST-1 Buoy Component Re-design.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603609N / *Conventional Munitions* | Project (Number/Name)<br>0363 / *Insensitive Munitions Adv. Development* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0363: *Insensitive Munitions Adv. Development* | 230.411 | 8.342 | 8.909 | 8.414 | - | 8.414 | 8.434 | 8.628 | 8.768 | 8.941 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Energetic materials producibility is demonstrated to assure national capability to produce and load munitions systems. The program leverages are being closely coordinated with other military departments, North Atlantic Treaty Organization (NATO) and allied countries to eliminate redundant efforts and maximize efficiency. A joint service IM requirement has been developed and through the IM strategic planning process, all Program Executive Offices (PEO) are implementing IM in their priority munitions. IM are identified as a Department of Defense (DoD) critical technology requirement and considered as part of a weapon design. The IMAD program matures the technology developed by a variety of Science and Technology (S&T) sources for program management integration into weapons systems to meet the IM technical deficiencies documented in the PEO IM Strategic Plans. IMAD provides the link between S&T programs and the program managers (PM) by optimizing IM technologies to meet Navy requirements. IMAD offers risk mitigation for the PMs in terms of IM technical knowledge, expertise and manpower with the state of the art expertise across IM products. Each technology area is divided into subtasks addressing specific munition and munition class IM deficiencies.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Insensitive Munitions Adv. Development | 8.342 | 8.909 | 8.414 | 0.000 | 8.414 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Validate and assess weapon systems plan of action and milestones for IM compliance. Review Insensitive Munitions Strategic Plan (IMSP) for Navy compile and analyze weapon system, energetic material and generic technology IM test data. Perform Threat Hazard Assessments (THAs). Perform analysis of energetic material properties logistic process. Review IM certification and waivers. Support Insensitive Munitions Council (IMC), Insensitive Munitions Coordination Group (IMCG), and IMC Working Group. Support and develop Insensitive Munitions Technology Tool (IMT2). Support North Atlantic Treaty Organization Standardization Agreement (NATO STANAG) and Advanced Operations (AOP) development. Support IMAD program briefs. Support all Navy Joint Services Insensitive Munitions Technical Panel (JSIMTP) meetings. Support Explosive Safety Working Group (ESWG) meetings. Provide task management support for financial management, review of programmatic deliverables and overall task coordination. | | | | | |
| ***FY 2018 Plans:***<br>FY 2018 plans are to: | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603609N / *Conventional Munitions* | **Project (Number/Name)**<br>0363 / *Insensitive Munitions Adv. Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Evaluate and demonstrate improved solid propellant for Insensitive Munition (IM) compliant rocket motor systems and container cook off migration. Evaluate and demonstrate new rocket motor case technology that can significantly reduce reaction violence of missile and rocket propulsion systems exposed to unplanned stimuli. Develop, demonstrate, and qualify new rocket propellant formulations that meet and/or improve system performance for air launched weapons and meet and/or improve IM goals Develop, demonstrate, and qualify new gun propellant formulations for Hyper Velocity Projectile (HVP) that meet and/or improve system performance and meet and/or improve IM goals. Evaluate new ordnance and container concepts. Qualify next generation area attack weapon fragment impact evaluation. Evaluate azobis isobutyronitrile (AIBN) as a replacement of t-butylperoxy (2-ethylhexanoate) (TBP) in the manufacturing of PBXN-112 and PBXC-139. Evaluation, demonstration, and qualification of new explosives that reduce collateral damage when bombs are exposed to thermal and impact threats. Develop and demonstrate new and improved stowage and container materials that achieve compliance with IM criteria while significantly reducing the logistics footprint by lowering system weight. Demonstrate SCO and FI of the EXTL-65 Propellant in a HVPW rocket motor. Develop and demonstrate ballistic barrier concepts to improve or eliminate IM impact threats in logistical transportation and storage conditions. Evaluate Shoulder-launched Assault Munitions IM (combined effects). Evaluate qualification potential of explosives using new resonant acoustic mixing (RAM) of explosive ingredients.<br>Develop and demonstrate new and improved explosive initiation systems that improve IM and reliably initiate IM explosives.<br>Evaluate qualification potential of explosives using new resonant acoustic mixing (RAM) of explosive ingredients. | | | | | |
| ***FY 2019 Base Plans:***<br>FY 2019 plans are to:<br>Evaluate and demonstrate improved solid propellant for Insensitive Munitions (IM) compliant rocket motor systems and container cook off migration. Evaluate and demonstrate new rocket motor case technology that can significantly reduce reaction violence of missile and rocket propulsion systems exposed to unplanned stimuli. Develop, demonstrate, and qualify new rocket propellant formulations that meet and/or improve system performance for air launched weapons and meet and/or improve IM goals. Develop, demonstrate, and qualify a Reduced Sensitivity Solventless Gun Propellant. Evaluate new ordnance and container concepts. Qualify next generation area attack weapon fragment impact evaluation. Evaluate Slow Heating Oven Designs. Demonstrate IM Improvement through Integral Rocket Solid Fuel Ramjet Technology. Evaluation, demonstration, and qualification of new explosives that reduce collateral damage when bombs are exposed to thermal and impact threats. Develop and demonstrate new and improved stowage and container materials that achieve compliance with IM criteria while significantly reducing the logistics footprint by lowering system | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603609N / *Conventional Munitions* | **Project (Number/Name)**<br>0363 / *Insensitive Munitions Adv. Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| weight. Develop and demonstrate new sensors that will detect and indicate thermal events real time. The sensor can provide warning signal and be capable to initiate venting systems. Develop and demonstrate ballistic barrier concepts to improve or eliminate IM impact threats in logistical transportation and storage conditions.<br>Develop and demonstrate new and improved explosive initiation systems that improve IM and reliably initiate IM explosives. Evaluate qualification potential of explosives using new resonant acoustic mixing (RAM) of explosive ingredients.<br>Develop and demonstrate new and improved explosive initiation systems that improve IM and reliably initiate IM explosives.<br>Evaluate qualification potential of explosives using new resonant acoustic mixing (RAM) of explosive ingredients.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No significant change from FY 2018 to FY 2019. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 8.342 | 8.909 | 8.414 | 0.000 | 8.414 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

IMAD is assigned as a non-ACAT program and therefore does not have program milestones like the ACAT I to IV programs. IMAD develops and evaluates IM technologies for use in Navy weapon systems and is not part of a particular weapon acquisition program

**E. Performance Metrics**

Quarterly program reviews

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603609N / *Conventional Munitions* | **Project (Number/Name)**<br>0363 / *Insensitive Munitions Adv. Development* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PROPULSION DEV. AND EVAL. | WR | NAWC DIV/CHINA LAKE : WX | 99.652 | 3.100 | Nov 2016 | 3.419 | Nov 2017 | 3.373 | Nov 2018 | - | | 3.373 | Continuing | Continuing | Continuing |
| EXPLOSIVES DEV. AND EVAL. | WR | NSWC/INDIAN HEAD DIV. : WX | 84.366 | 2.016 | Nov 2016 | 2.151 | Nov 2017 | 2.002 | Nov 2018 | - | | 2.002 | Continuing | Continuing | Continuing |
| ORDNANCE DEV. AND EVAL. | WR | NSWC/DAHLGREN : WX | 26.352 | 1.097 | Nov 2016 | 1.171 | Nov 2017 | 1.025 | Nov 2018 | - | | 1.025 | Continuing | Continuing | Continuing |
| GUN PROPULSION AND EVAL. | WR | NSWC/INDIAN HEAD DIV. : WX | 9.531 | 1.176 | Nov 2016 | 1.255 | Nov 2017 | 1.015 | Nov 2018 | - | | 1.015 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 219.901 | 7.389 | | 7.996 | | 7.415 | | - | | 7.415 | Continuing | Continuing | N/A |

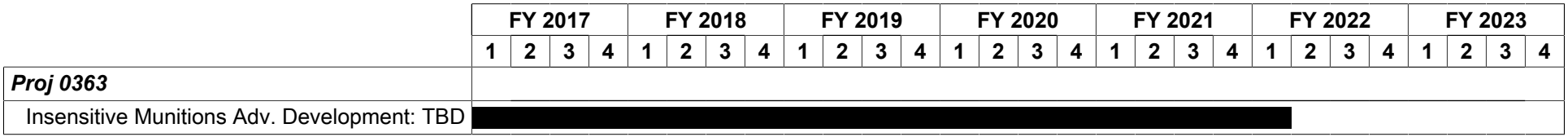
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PROGRAM MANAGEMENT SUPT | WR | NOSSA : IN HEAD MD | 6.121 | 0.175 | Nov 2016 | 0.192 | Nov 2017 | 0.209 | Nov 2018 | - | | 0.209 | Continuing | Continuing | Continuing |
| PROGRAM MANAGEMENT SUPPORT | MIPR | DTIC : FT BELVOIR VA | 4.389 | 0.778 | Nov 2016 | 0.721 | Nov 2017 | 0.790 | Nov 2018 | - | | 0.790 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 10.510 | 0.953 | | 0.913 | | 0.999 | | - | | 0.999 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 230.411 | 8.342 | | 8.909 | | 8.414 | | - | | 8.414 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603609N / *Conventional Munitions* | **Project (Number/Name)**<br>0363 / *Insensitive Munitions Adv. Development* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603609N / *Conventional Munitions* | **Project (Number/Name)**<br>0363 / *Insensitive Munitions Adv. Development* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 0363*** | | | | |
| Insensitive Munitions Adv. Development: TBD | 1 | 2017 | 1 | 2022 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603609N / *Conventional Munitions* | Project (Number/Name)<br>3436 / *AN/BST-1 Buoy Component Re-Design* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3436: *AN/BST-1 Buoy Component Re-Design* | 0.000 | 0.000 | 0.000 | 0.893 | - | 0.893 | 1.554 | 2.133 | 0.000 | 0.000 | 0.000 | 4.580 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The AN/BST-1 Submarine Emergency Communication Transmitter informs Navy leadership when a ballistic missile submarine is in extremis. When activated, a buoy is released from the submarine, floats to the surface and transmits an emergency signal. The energetic components in the system release the buoy from the submarine, separate protective covers and actuate an antenna for communication. The AN/BST-1 Buoy energetic component re-design will replace two antenna related explosive components that utilize explosive formulations that are no longer produced due to environmental impact. The re-design will support future procurements for OHIO and COLUMBIA class deployments. The energetic component re-design includes design, prototyping, design verification testing, environmental qualification, hazard classification, insensitive munitions and developmental testing. The two re-designed energetic components will be qualified for Navy use at the conclusion of the program.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Systems Engineering and Testing | 0.000 | 0.000 | 0.893 | 0.000 | 0.893 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>None, program is FY19 new start. | | | | | |
| ***FY 2019 Base Plans:***<br>-Award contract for designing and testing prototypes.<br>-Finalize design and complete prototype testing in FY2019.<br>-Supporting design verification testing and qualification in FY2020 and FY2021. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Increase due to program being a new start in FY19. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 0.000 | 0.893 | 0.000 | 0.893 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603609N / *Conventional Munitions* | **Project (Number/Name)**<br>3436 / *AN/BST-1 Buoy Component Re-Design* |

**C. Other Program Funding Summary ($ in Millions)**

**Remarks**

**D. Acquisition Strategy**

The AN/BST-1 Buoy energetic component re-design will be directed by government activities teaming with industry for design and production support. The re-designed components will be qualified for Navy use in FY2022.

**E. Performance Metrics**

Quarterly Program Reviews and semi-annual Design Reviews.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603609N / *Conventional Munitions* | Project (Number/Name)<br>3436 / *AN/BST-1 Buoy Component Re-Design* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Produce Drawings, Prototypes and Test | C/CPFF | TBD : Not Specified | 0.000 | 0.000 | | 0.000 | | 0.586 | Mar 2019 | - | | 0.586 | 3.200 | 3.786 | 4.400 |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 0.586 | | - | | 0.586 | 3.200 | 3.786 | N/A |

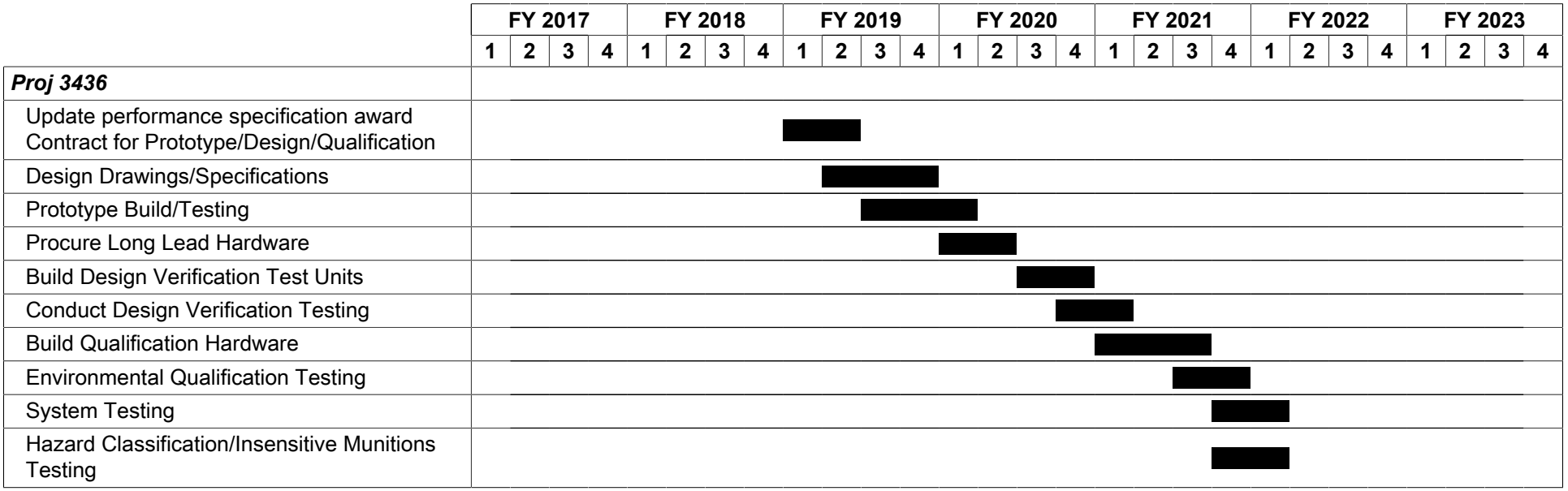
**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Government Enginering Services | WR | NSWC, IHEODTD : Indian Head, MD | 0.000 | 0.000 | | 0.000 | | 0.252 | Oct 2018 | - | | 0.252 | 0.500 | 0.752 | - |
| Government Enginering Services | WR | NSWC, Crane : Crane, IN | 0.000 | 0.000 | | 0.000 | | 0.055 | Oct 2018 | - | | 0.055 | 0.100 | 0.155 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 0.307 | | - | | 0.307 | 0.600 | 0.907 | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 0.000 | | 0.893 | | - | | 0.893 | 3.800 | 4.693 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603609N / *Conventional Munitions* | **Project (Number/Name)**<br>3436 / *AN/BST-1 Buoy Component Re-Design* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603609N / *Conventional Munitions* | **Project (Number/Name)**<br>3436 / *AN/BST-1 Buoy Component Re-Design* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3436*** | | | | |
| Update performance specification award Contract for Prototype/Design/Qualification | 1 | 2019 | 2 | 2019 |
| Design Drawings/Specifications | 2 | 2019 | 4 | 2019 |
| Prototype Build/Testing | 3 | 2019 | 1 | 2020 |
| Procure Long Lead Hardware | 1 | 2020 | 2 | 2020 |
| Build Design Verification Test Units | 3 | 2020 | 4 | 2020 |
| Conduct Design Verification Testing | 4 | 2020 | 1 | 2021 |
| Build Qualification Hardware | 1 | 2021 | 3 | 2021 |
| Environmental Qualification Testing | 3 | 2021 | 4 | 2021 |
| System Testing | 4 | 2021 | 1 | 2022 |
| Hazard Classification/Insensitive Munitions Testing | 4 | 2021 | 1 | 2022 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603611M *I Marine Corps Assault Vehicles* |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Program Element | 426.229 | 131.381 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 557.610 |
| 0025: *Amphibious Combat Vehicle 1.1* | 426.229 | 131.381 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 557.610 |

**Program MDAP/MAIS Code:**
**Project MDAP/MAIS Code(s):** P472

**Note**

ACV Increment 1.1 leverages and continues the work that was previously accomplished under the Marine Personnel Carrier (MPC) program, funded in PE 0206623M; Project 9C85.

Beginning in FY 2018, the program funding transitions from Program Element 0603611M Marine Corps Assault Vehicles to Program Element 0605611M MC AVS Development and Demonstration as the program proceeds through the acquisition process.

**A. Mission Description and Budget Item Justification**

The Amphibious Combat Vehicle is an armored personnel carrier, balanced in performance, protection, and payload for employment within the Ground Combat Element (GCE) and throughout the range of military operations, to include a swim capability.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 158.682 | 0.000 | 0.000 | - | 0.000 |
| Current President's Budget | 131.381 | 0.000 | 0.000 | - | 0.000 |
| Total Adjustments | -27.301 | 0.000 | 0.000 | - | 0.000 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | -3.588 | 0.000 | | | |
| • SBIR/STTR Transfer | -3.794 | 0.000 | | | |
| • Rate/Misc Adjustments | 0.001 | 0.000 | 0.000 | - | 0.000 |
| • Congressional Directed Reductions Adjustments | -19.920 | - | - | - | - |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603611M *I Marine Corps Assault Vehicles* |

**Change Summary Explanation**

Beginning in FY 2018, the program funding transitions from Program Element 0603611M Marine Corps Assault Vehicles to Program Element 0605611M MC AVS Development and Demonstration as the program proceeds through the acquisition process.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | | | | | R-1 Program Element (Number/Name)<br>PE 0603611M / *Marine Corps Assault Vehicles* | | | | Project (Number/Name)<br>0025 / *Amphibious Combat Vehicle 1.1* | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| 0025: *Amphibious Combat Vehicle 1.1* | 426.229 | 131.381 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 557.610 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Project MDAP/MAIS Code:** P472

**A. Mission Description and Budget Item Justification**

The Amphibious Combat Vehicle is an armored personnel carrier, balanced in performance, protection, and payload for employment within the Ground Combat Element (GCE) and throughout the range of military operations, to include a swim capability. Funds support Amphibious Combat Vehicle (ACV) Increment 1.1 Engineering, Manufacturing and Development (EMD) contracts, Test & Evaluation (T&E) activities and associated program support.

ACV Increment 1.1 leverages and continues the work previously accomplished under the Marine Personnel Carrier (MPC) program, funded in PE 0206623M; Project 9C85.

Beginning in FY 2018, the program funding transitions from Program Element 0603611M Marine Corps Assault Vehicles to Program Element 0605611M MC AVS Development and Demonstration as the program proceeds through the acquisition process.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Product Development | 88.122 | 0.000 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** System design and development; EMD test vehicle manufacturing; prime contractor Developmental and Operational test, and Logistics Management Information (LMI) data development.<br>***FY 2018 Plans:***<br>N/A<br>***FY 2019 Base Plans:***<br>N/A<br>***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***Title:*** Management Services | 10.520 | 0.000 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603611M / *Marine Corps Assault Vehicles* | **Project (Number/Name)**<br>0025 / *Amphibious Combat Vehicle 1.1* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Description:*** Contract Advisory and Assistance Services (Engineering and Technical Support, Management Support Services, and Studies and Analyses).<br>***FY 2018 Plans:***<br>N/A<br>***FY 2019 Base Plans:***<br>N/A<br>***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***Title:*** Test & Evaluation<br>***Articles:***<br>***Description:*** Government Developmental, Operational, and Live Fire Test and Evaluation activities.<br>***FY 2018 Plans:***<br>N/A<br>***FY 2019 Base Plans:***<br>N/A<br>***FY 2019 OCO Plans:***<br>N/A | 25.540<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- |
| ***Title:*** Program Support<br>***Articles:***<br>***Description:*** Government labor, material, and travel for integrated logistics support, technical publications, support equipment development, in-house technical support, and program management support.<br>***FY 2018 Plans:***<br>N/A<br>***FY 2019 Base Plans:***<br>N/A<br>***FY 2019 OCO Plans:*** | 7.199<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603611M / *Marine Corps Assault Vehicles* | **Project (Number/Name)**<br>0025 / *Amphibious Combat Vehicle 1.1* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 131.381 | 0.000 | 0.000 | 0.000 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • PMC/2025: *Amphibious Combat Vehicle 1.1* | 0.000 | 161.511 | 167.478 | - | 167.478 | 286.098 | 507.400 | 0.000 | 0.000 | 0.000 | 1,122.487 |
| • PMC/7000/0605611M-1: *Initial Spares - ACV 1.1* | 0.000 | 5.569 | 6.145 | - | 6.145 | 13.960 | 13.643 | 0.000 | 0.000 | 0.000 | 39.317 |
| • RDT&E/0605611M/0025: *Amphibious Combat Vehicle 1.1* | 0.000 | 178.993 | 42.448 | - | 42.448 | 19.703 | 0.462 | 0.000 | 0.000 | 0.000 | 241.606 |
| • RDT&E/0605611M/0026: *Amphibious Combat Vehicle 1.2* | 0.000 | 0.000 | 55.775 | - | 55.775 | 57.978 | 57.477 | 43.533 | 8.341 | 0.000 | 223.104 |
| • PMC/2026: *Amphibious Combat Vehicle 1.2* | 0.000 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 710.373 | 701.456 | Continuing | Continuing |
| • PMC/7000/0605611M: *Initial Spares - ACV 1.2* | 0.000 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 19.346 | 19.773 | Continuing | Continuing |

**Remarks**

**D. Acquisition Strategy**

The program office awarded two competitive Engineering, Manufacturing and Development (EMD) contracts to two vendors to build 16 test vehicles each (32 total). ACV Increment 1.1 entered the acquisition cycle at Milestone B in FY 2016 and will down-select to one vendor at Milestone C. In FY 2018, the program will enter into Low Rate Initial Production (LRIP) and Full Rate Production (FRP) will begin in FY 2020.

**E. Performance Metrics**

Milestone Reviews
Milestone B: 1QFY16
Milestone C: 3QFY18

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603611M / *Marine Corps Assault Vehicles* | **Project (Number/Name)**<br>0025 / *Amphibious Combat Vehicle 1.1* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| System Design & Development | C/FPIF | Various : Various | 316.825 | 88.122 | Jan 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 404.947 | - |
| Other Product Development | C/FFP | SPAWAR/ NEW JERSEY : Charleston/Picatinny | 13.844 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 13.844 | - |
| Prior Years Cumulative Funding | Various | Various : Various | 18.506 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 18.506 | - |
| | | **Subtotal** | 349.175 | 88.122 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 437.297 | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Test and Evaluation - EMD Detailed Planning | WR | AVTB : Camp Pendleton, CA | 1.069 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.069 | - |
| Propulsion System Demonstrator | WR | NSWC Carderock - SSES Philly : Philadelphia, PA | 1.193 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.193 | - |
| Integrated Logistics Support | WR | NSWC - Dahlgren : Dahlgren, VA | 1.473 | 0.616 | Apr 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.089 | - |
| Technical Data & Pubs Development | WR | NSWC Carderock : Philadelphia, PA | 0.050 | 0.100 | Sep 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.150 | - |
| GFP Management | WR | SPAWAR Charleston : SPAWAR Charleston | 23.843 | 6.233 | Apr 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 30.076 | - |
| Travel | Various | Various : Various | 0.791 | 0.250 | Sep 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.041 | - |
| | | **Subtotal** | 28.419 | 7.199 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 35.618 | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603611M / *Marine Corps Assault Vehicles* | **Project (Number/Name)**<br>0025 / *Amphibious Combat Vehicle 1.1* |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Operational Test Evaluation (OT&E) | WR | MCOTEA : Quantico, Va | 0.258 | 1.950 | Jan 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.208 | - |
| Development Test & Evaluation | WR | Various : Various | 2.740 | 18.721 | Jan 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 21.461 | - |
| Live Fire Test & Evaluation | WR | Various : Various | 2.487 | 4.869 | Jan 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 7.356 | - |
| | | **Subtotal** | 5.485 | 25.540 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 31.025 | N/A |

**Remarks**

* The FY 2017 award date for cost categories with various activities is the actual obligation date for the last award in the category.

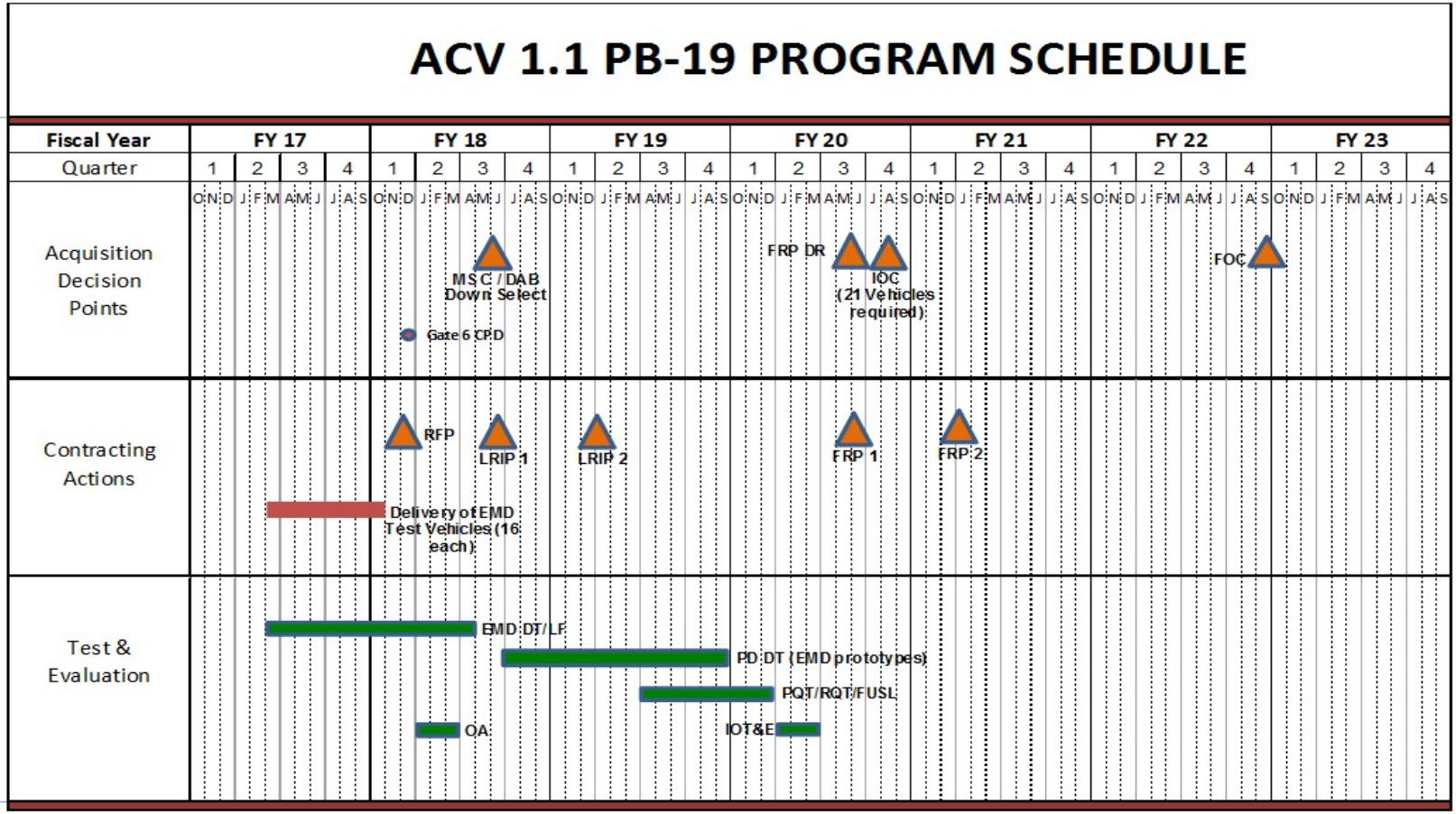
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Engineering and Technical Services | C/FFP | Various : Various | 17.509 | 1.666 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 19.175 | - |
| Management Support Services | C/FFP | DDG : Stafford VA | 19.326 | 8.854 | Mar 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 28.180 | - |
| Studies and Analyses | C/FFP | Various : Various | 6.315 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 6.315 | - |
| | | **Subtotal** | 43.150 | 10.520 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 53.670 | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 426.229 | 131.381 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 557.610 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603611M / *Marine Corps Assault Vehicles* | **Project (Number/Name)**<br>0025 / *Amphibious Combat Vehicle 1.1* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603611M / *Marine Corps Assault Vehicles* | **Project (Number/Name)**<br>0025 / *Amphibious Combat Vehicle 1.1* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 0025*** | | | | |
| EMD Vehicle Delivery (32 Vehicles) | 2 | 2017 | 1 | 2018 |
| Vehicle Acceptance Review | 2 | 2017 | 1 | 2018 |
| Development Test/Live Fire Test | 2 | 2017 | 1 | 2020 |
| Tactics, Techniques, and Procedures (TTP) Development | 3 | 2017 | 4 | 2017 |
| Production Readiness Review (PRR) | 1 | 2018 | 1 | 2018 |
| Operational Assessment (OA) | 2 | 2018 | 3 | 2018 |
| System Verification Review (SVR) | 2 | 2018 | 2 | 2018 |
| JROC Capabilities Production Document (CPD) | 3 | 2018 | 3 | 2018 |
| MS C/DAB Down Select | 3 | 2018 | 3 | 2018 |
| LRIP Option 1 Exercised | 3 | 2018 | 3 | 2018 |
| Physical Configuration Audit (PCA) | 4 | 2019 | 4 | 2019 |
| LRIP Option 2 Exercised | 2 | 2019 | 2 | 2019 |
| Initial Operational Test & Evaluation (IOT&E)/Full Up System Level (FUSL) | 2 | 2020 | 2 | 2020 |
| Full Rate Production (FRP) Decision | 3 | 2020 | 3 | 2020 |
| FRP #1 Option Exercised | 3 | 2020 | 3 | 2020 |
| Initial Operational Capability (IOC) | 4 | 2020 | 4 | 2020 |
| FRP #2 Option Exercised | 2 | 2021 | 2 | 2021 |
| Full Operational Capability (FOC) | 4 | 2022 | 4 | 2022 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603635M *I Marine Corps Grnd Cmbt/Supt Sys* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 33.891 | 1.043 | 1.428 | 1.828 | - | 1.828 | 1.855 | 1.886 | 1.915 | 1.943 | Continuing | Continuing |
| 1964: *Anti-Armor Weapon System* | 4.097 | 0.776 | 1.023 | 0.962 | - | 0.962 | 0.980 | 1.004 | 1.026 | 1.047 | Continuing | Continuing |
| 2614: *SMAW Follow-On* | 29.794 | 0.267 | 0.405 | 0.866 | - | 0.866 | 0.875 | 0.882 | 0.889 | 0.896 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

This PE supports the demonstration and validation of Marine Corps Ground/Supporting Arms Systems for utilization in Marine Air-Ground Expeditionary Force amphibious operations. This program is funded under Demonstration & Validation because it develops and integrates hardware for experimental tests related to specific ground weapon systems.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 1.303 | 1.428 | 1.355 | - | 1.355 |
| Current President's Budget | 1.043 | 1.428 | 1.828 | - | 1.828 |
| Total Adjustments | -0.260 | 0.000 | 0.473 | - | 0.473 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | -0.228 | 0.000 | | | |
| • SBIR/STTR Transfer | -0.032 | 0.000 | | | |
| • Rate/Misc Adjustments | 0.000 | 0.000 | 0.473 | - | 0.473 |

**Change Summary Explanation**

The increase in funding from FY17 to FY18 is due to efforts to improve the Saber power system and the Global Positioning System (GPS) of the Saber system.

The decrease in funding from FY18 to FY19 is due to efforts to improve the Saber power system and the Global Positioning System (GPS) of the Saber system in FY18.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603635M / *Marine Corps Grnd Cmbt/ Supt Sys* | Project (Number/Name)<br>1964 / *Anti-Armor Weapon System* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1964: *Anti-Armor Weapon System* | 4.097 | 0.776 | 1.023 | 0.962 | - | 0.962 | 0.980 | 1.004 | 1.026 | 1.047 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The M41A7 Saber system is the primary heavy, anti-armor launch system for the TOW Missile within the Ground Combat Element of the Marine Corps. The Anti-Armor Weapons System-Heavy (AAWS-H) program, working in concert with the U.S. Army, will develop and integrate technology improvements into the Improved Target Acquisition System (ITAS) to meet Increment II system requirements as jointly agreed. Improvements centered on integration of sight image enhancements were concluded in FY13. Other efforts have focused on providing engineering and technical support such as the study of densified propellant and battery replacement for the Saber system (far-target location accuracy improvements). Laser designation capability has been postponed due to prioritization.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Saber Battery Replacement | 0.557 | 0.508 | 0.562 | 0.000 | 0.562 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>-Continue research of a replacement battery for Saber to address safety concerns, while maintaining the same or increased capabilities for power and longevity. This is an on-going effort through FY19.<br>***FY 2019 Base Plans:***<br>-Continue efforts for Saber battery through reliability testing to enhance capabilities.<br>-Initiate qualification testing of the replacement battery for Saber.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No significant change from FY 2018 to FY 2019. | | | | | |
| ***Title:*** Management Support | 0.000 | 0.420 | 0.200 | 0.000 | 0.200 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** The decrease in funding from FY18 to FY19 ($0.220M) is due to reduced management support efforts. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603635M / *Marine Corps Grnd Cmbt/ Supt Sys* | **Project (Number/Name)**<br>1964 / *Anti-Armor Weapon System* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***FY 2018 Plans:***<br>-Initiate support for product improvement upgrades for the Saber System, engineering, logistics, and program office support.<br>***FY 2019 Base Plans:***<br>-Continue support for product improvement upgrades for the Saber System, engineering, logistics, and program office support.<br>-Initiate support for qualification testing of the replacement battery for Saber.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No significant change from FY 2018 to FY 2019. | | | | | |
| ***Title:*** Global Positioning System (GPS) Improvement | 0.219 | 0.095 | 0.200 | 0.000 | 0.200 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>-Continue research for improvements to future GPS for the Saber system.<br>-Continue prototype testing of the Far-Target Locator and assess results.<br>***FY 2019 Base Plans:***<br>-Continue research for improvements to future GPS for the Saber system.<br>-Continue prototype testing of the Far-Target Locator and assess results.<br>-Initiate the review of Army test reports and prototypes for Marine Corps evaluation.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No significant change from FY 2018 to FY 2019. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.776 | 1.023 | 0.962 | 0.000 | 0.962 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603635M / *Marine Corps Grnd Cmbt/ Supt Sys* | **Project (Number/Name)**<br>1964 / *Anti-Armor Weapon System* |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • PMC/3017: *Anti-Armor Weapon Systems-Heavy* | 17.080 | 56.577 | 59.702 | - | 59.702 | 39.092 | 40.968 | 42.956 | 33.778 | Continuing | Continuing |

**Remarks**

**D. Acquisition Strategy**

The Saber system is a joint program with the U.S. Army. Funding supports the development, integration, and qualification of incremental improvements to meet objective requirements and assesses emergent technologies.

**E. Performance Metrics**

N/A

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603635M / *Marine Corps Grnd Cmbt/ Supt Sys* | Project (Number/Name)<br>1964 / *Anti-Armor Weapon System* | |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Anti Armor | WR | NSWC Indian Head : Indian Head, MD | 2.622 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.622 | - |
| Saber Battery Replacement Testing and Research | WR | NSWC Crane : Crane, IN | 1.475 | 0.557 | Oct 2016 | 0.508 | Jan 2018 | 0.562 | Feb 2019 | - | | 0.562 | 0.000 | 3.102 | - |
| Global Positioning System (GPS) Improvement | MIPR | CCWS Redstone Arsenal : Huntsville, AL | 0.000 | 0.219 | Feb 2017 | 0.095 | Apr 2018 | 0.200 | Apr 2019 | - | | 0.200 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 4.097 | 0.776 | | 0.603 | | 0.762 | | - | | 0.762 | Continuing | Continuing | N/A |

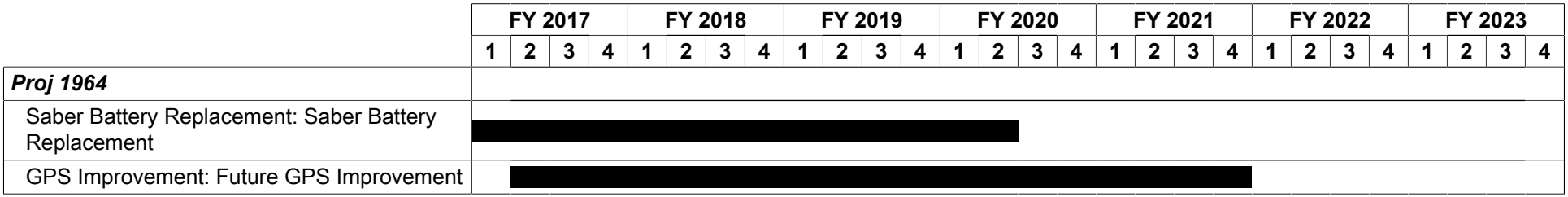
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Management Support | C/FFP | Not Specified : Not Specified | 0.000 | 0.000 | | 0.420 | Mar 2018 | 0.200 | Mar 2019 | - | | 0.200 | 0.000 | 0.620 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.420 | | 0.200 | | - | | 0.200 | 0.000 | 0.620 | N/A |

| | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 4.097 | 0.776 | | 1.023 | | 0.962 | | - | | 0.962 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603635M / *Marine Corps Grnd Cmbt/ Supt Sys* | **Project (Number/Name)**<br>1964 / *Anti-Armor Weapon System* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603635M / *Marine Corps Grnd Cmbt/ Supt Sys* | **Project (Number/Name)**<br>1964 / *Anti-Armor Weapon System* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 1964*** | | | | |
| Saber Battery Replacement: Saber Battery Replacement | 1 | 2017 | 2 | 2020 |
| GPS Improvement: Future GPS Improvement | 2 | 2017 | 4 | 2021 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603635M / *Marine Corps Grnd Cmbt/ Supt Sys* | Project (Number/Name)<br>2614 / *SMAW Follow-On* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2614: *SMAW Follow-On* | 29.794 | 0.267 | 0.405 | 0.866 | - | 0.866 | 0.875 | 0.882 | 0.889 | 0.896 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Follow on to Shoulder-Launched Multipurpose Assault Weapon (SMAW) (FOTS):
The solution to the Follow on to SMAW (FOTS) capability requirement is a Family of Marine-portable Rocket Systems. This Family of Systems is composed of separate lightweight, short range, fire-and-forget weapons. Marine Expeditionary Forces will employ the Family of Systems across the spectrum of conflict, under all environmental conditions, to neutralize or destroy a variety of ground targets including personnel, thin-skinned vehicles, and positions. The Family of Systems include various systems, such as SMAW Mod 2 and M3A1 Multi-purpose Anti-Armor Weapon System (MAAWS), with future capability for expansion to additional systems. SMAW Mod 2 consists of a new launcher with an integrated laser range finder and thermal sight. MAAWS consists of a new launcher and integrated fire control system. Future systems and capabilities include similar Marine-portable fire-and-forget shoulder-launched rocket systems with anti-armor, anti-personnel, anti-material, and assault capabilities.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Engineer and technical support. | 0.267 | 0.405 | 0.866 | 0.000 | 0.866 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>-Continue engineering support for the development and testing of the Densified Propellant.<br>-Continue qualification of Densified Propellant in accordance with Technology Transition Agreement (TTA).<br>-Continue development of replacement bore sight kit.<br>-Continue qualification of current millijoule meter.<br>-Initiate MAAWS qualification, performance testing and Marine-specific tests include E3 and Navy/Marine Corps transportation requirements unique to the Marine Corps. Other Marine-unique tests may include support equipment and potential modifications to existing FOTS support equipment. | | | | | |
| ***FY 2019 Base Plans:***<br>-Continue engineering support for the development and testing of the Densified Propellant.<br>-Continue qualification of Densified Propellant in accordance with Technology Transition Agreement (TTA).<br>-Continue development of replacement bore sight kit.<br>-Complete qualification of current millijoule meter.<br>-Initiate integration and transition of Densified Propellant and other technology developments into the program. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603635M / *Marine Corps Grnd Cmbt/ Supt Sys* | **Project (Number/Name)**<br>2614 / *SMAW Follow-On* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| -Continue MAAWS qualification, performance testing and Marine-specific tests include E3 and Navy/Marine Corps transportation requirements unique to the Marine Corps. Other Marine-unique tests may include support equipment and potential modifications to existing FOTS support equipment.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Increase of $0.461 supports development and qualification of upgraded components to the SMAW MOD 2 system and the M3A1 Multi-purpose Anti-Armor Weapon System (MAAWS), with future capability for expansion to additional systems. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.267 | 0.405 | 0.866 | 0.000 | 0.866 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • PMC/3016: *Follow on to SMAW* | 22.918 | 25.174 | 13.760 | - | 13.760 | 13.789 | 13.810 | 13.828 | 13.839 | Continuing | Continuing |

**Remarks**

**D. Acquisition Strategy**

Strategy is to complete development and qualification of upgraded components to the SMAW MOD 2 system and M3A1 Multi-purpose Anti-Armor Weapon System (MAAWS), with future capability for expansion to additional systems. SMAW Mod 2 consists of a new launcher with an integrated laser range finder and thermal sight. MAAWS consists of a new launcher and integrated fire control system. Future systems and capabilities include similar Marine-portable fire-and-forget shoulder-launched rocket systems with anti-armor, anti-personnel, anti-material, and assault capabilities. MAAWS test efforts in conjunction with the Army include qualification and performance testing. In addition, Marine-specific tests include E3 and Navy/Marine Corps transportation requirements unique to the Marine Corps. Other Marine-unique tests may include support equipment and potential modifications to existing FOTS support equipment.

**E. Performance Metrics**

Milestone reviews and technical reviews.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603635M / *Marine Corps Grnd Cmbt/ Supt Sys* | Project (Number/Name)<br>2614 / *SMAW Follow-On* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Prior Year Cumulative Funding | Various | Various : Various | 1.748 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 1.748 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Prior Year Cumulative Funding | Various | Various : Various | 16.300 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Engineering & Technical Support | WR | NSWC Indian Head : Indian Head, VA | 0.841 | 0.145 | Jan 2017 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Engineering & Technical Support | WR | NSWC Dahlgren : Dahlgren, VA | 0.000 | 0.122 | Jan 2017 | 0.405 | Jan 2018 | 0.866 | Jan 2019 | - | | 0.866 | 0.000 | 1.393 | - |
| | | **Subtotal** | 17.141 | 0.267 | | 0.405 | | 0.866 | | - | | 0.866 | Continuing | Continuing | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Operational Testing & Support | WR | Marine Corps Operational Test & Eval Activity : Quantico, VA | 5.164 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Prior year cumulative funding | Various | Various : Various | 0.326 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.326 | - |
| | | **Subtotal** | 5.490 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603635M / *Marine Corps Grnd Cmbt/ Supt Sys* | Project (Number/Name)<br>2614 / *SMAW Follow-On* | |

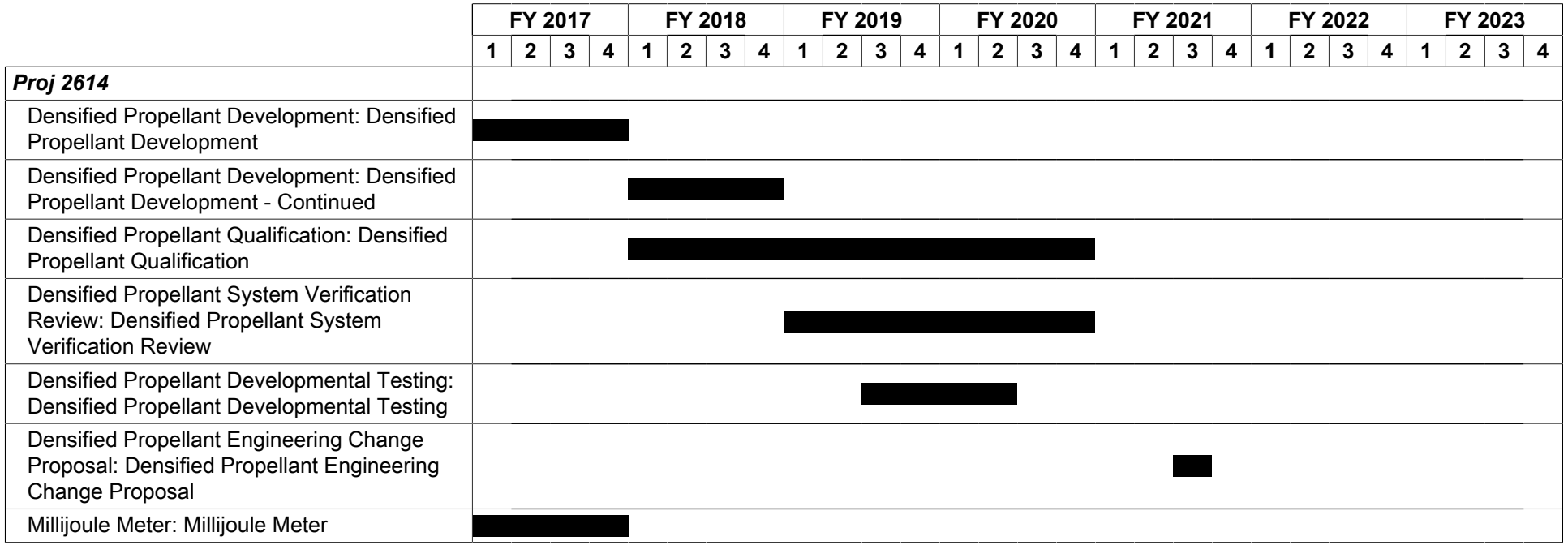
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Prior year cumulative funding | Various | Various : Various | 5.415 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 5.415 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 29.794 | 0.267 | | 0.405 | | 0.866 | | - | | 0.866 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603635M / *Marine Corps Grnd Cmbt/ Supt Sys* | **Project (Number/Name)**<br>2614 / *SMAW Follow-On* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603635M / *Marine Corps Grnd Cmbt/ Supt Sys* | **Project (Number/Name)**<br>2614 / *SMAW Follow-On* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 2614*** | | | | |
| Densified Propellant Development: Densified Propellant Development | 1 | 2017 | 4 | 2017 |
| Densified Propellant Development: Densified Propellant Development - Continued | 1 | 2018 | 4 | 2018 |
| Densified Propellant Qualification: Densified Propellant Qualification | 1 | 2018 | 4 | 2020 |
| Densified Propellant System Verification Review: Densified Propellant System Verification Review | 1 | 2019 | 4 | 2020 |
| Densified Propellant Developmental Testing: Densified Propellant Developmental Testing | 3 | 2019 | 2 | 2020 |
| Densified Propellant Engineering Change Proposal: Densified Propellant Engineering Change Proposal | 3 | 2021 | 3 | 2021 |
| Millijoule Meter: Millijoule Meter | 1 | 2017 | 4 | 2017 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603654N *I JT Service Explosive Ordn Dev* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 582.764 | 48.686 | 83.067 | 43.148 | 13.900 | 57.048 | 51.725 | 38.381 | 36.287 | 47.074 | Continuing | Continuing |
| 0377: *JT Service Expl Ord Disp System* | 365.499 | 13.540 | 13.572 | 7.839 | - | 7.839 | 18.192 | 6.034 | 6.683 | 11.377 | Continuing | Continuing |
| 1317: *EOD Diving System* | 107.448 | 6.467 | 5.113 | 4.357 | - | 4.357 | 4.527 | 4.621 | 3.977 | 4.816 | Continuing | Continuing |
| 3177: *Joint Counter Radio-Controlled IED Elec Warfare* | 0.000 | 13.194 | 45.264 | 14.016 | 13.900 | 27.916 | 11.414 | 11.731 | 9.755 | 12.155 | Continuing | Continuing |
| 4023: *VSW MCM/Force Protection UUV* | 109.817 | 15.485 | 19.118 | 16.936 | - | 16.936 | 17.592 | 15.995 | 15.872 | 18.726 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

This is a Joint Service Program.

This program provides for the development of Explosive Ordnance Disposal tools and equipment for use by all military services. The responsibility is assigned to the Navy as single service manager, by Department of Defense Directive 5160.62 of 26 April 1989, for management of the Joint Service Explosive Ordnance Disposal Research and Development Program.
Proliferation of sophisticated types of foreign and domestic ordnance and Improvised Explosive Devices necessitate a continuing development program to provide Explosive Ordnance Disposal personnel of all military services with the special equipment and tools required to support this mission.

This program also provides life support related equipment necessary to support the performance of Navy Explosive Ordnance Disposal tasks underwater. This equipment must have inherently low acoustic and magnetic signatures in order to allow the Explosive Ordnance Disposal technician to safely approach, render-safe and dispose of sea mines and other underwater ordnance.

This program also provides for the research and development of Electronic Warfare (EW) systems, equipment, procedures, and tactical aids for all military services against the threat posed by Radio-Controlled Improvised Explosive Devices (RCIEDs) and to prevent initiation of RCIEDs across the spectrum of Joint military operations. Utilize Joint requirements to provide a system of systems approach for a suite of equipment for mounted, dismounted, and fixed site operations; provide a Joint Counter RCIED EW (CREW) development of equipment, procedures, and tactical aids to make rapid improvements to performance, supportability and affordability, while maintaining pace with evolving global threat.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | Date: February 2018 |
|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | R-1 Program Element (Number/Name)<br>PE 0603654N *I JT Service Explosive Ordn Dev* | | | |
| **B. Program Change Summary ($ in Millions)** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** |
| Previous President's Budget | 46.911 | 53.367 | 44.474 | - | 44.474 |
| Current President's Budget | 48.686 | 83.067 | 43.148 | 13.900 | 57.048 |
| Total Adjustments | 1.775 | 29.700 | -1.326 | 13.900 | 12.574 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | 1.259 | 0.000 | | | |
| • SBIR/STTR Transfer | -1.463 | 0.000 | | | |
| • Program Adjustments | 3.500 | 29.700 | 0.000 | - | 0.000 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -1.326 | 13.900 | 12.574 |
| • Congressional General Reductions Adjustments | -0.021 | - | - | - | - |
| • Congressional Directed Reductions Adjustments | -1.500 | - | - | - | - |

**Change Summary Explanation**

Other Rate/Misc Adjustments: -$1.326M.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603654N / *JT Service Explosive Ordn Dev* | Project (Number/Name)<br>0377 / *JT Service Expl Ord Disp System* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0377: *JT Service Expl Ord Disp System* | 365.499 | 13.540 | 13.572 | 7.839 | - | 7.839 | 18.192 | 6.034 | 6.683 | 11.377 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

This Program Element (PE) Project (0377) provides funding for the detailed design, development, risk mitigation, issue resolution, integrations, test, test equipment, simulations and post-deployment improvements of specialized equipment, tools and assessment of accessories that expand range of military operations required to support DoD's only Joint Explosive Ordnance Disposal (EOD) programs.

EOD exclusively executes world-wide missions for detection/location, identification, render-safe, recovery, field and laboratory evaluation, and disposal of hazards and unexploded ordnance (UXO) that is a threat to military operations, installations, personnel, or material. UXO includes foreign and domestic, both conventional and non-conventional, including Improvised Explosive Devices (IEDs); hazards includes fuels weapons and weapons of mass destruction devices using radiological and biological means with or without explosives.

The responsibility is assigned to the Navy as single service manager, by Department of Defense Directive 5160.62 of 3 June 2011, for management of the Joint Service Explosive Ordnance Disposal Research and Development Program. EOD programs are designed to reduce the EOD operator's exposure to explosive hazards or limit the risk to an acceptable level. EOD operations range from hand entry of explosive devices by EOD technicians to robotic actions and sensing capabilities that provide a safe distance of the explosive hazard at a greatly reduced cost to trained and experienced EOD operators.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS) | 1.915 | 2.296 | 1.595 | 0.000 | 1.595 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Continue AEODRS Inc 2 Joint Service EOD Common Control Platform integration, testing and production readiness. Development of Software Mobile application for EOD digital handheld devices for Joint Service Decision Support System (DSS) tools. | | | | | |
| ***FY 2019 Base Plans:***<br>Continue the EOD Warfighter defined improvements to the JEOD DSS Portal and Mobile Field Kit; applications; and further the integration of AN/GSQ-275 Radiographic Imaging System EOD, Advanced EOD Robotics | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603654N / *JT Service Explosive Ordn Dev* | **Project (Number/Name)**<br>0377 / *JT Service Expl Ord Disp System* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| System (AEODRS), and other Joint Service EOD tools and equipment into the JEOD DSS Node 4 Common Controller.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Decrease from FY18 to FY19 is in accordance with planned program profile and is not due to a negative action against this effort. | | | | | |
| ***Title:*** EOD ROBOTICS | 10.345 | 9.956 | 6.244 | 0.000 | 6.244 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Continue development and test AEODRS Increment 2 Prime System Integrator Production Representative/First Articles Systems and prepare for production and manufacturing. Prepare for AEODRS Increment 3 (Base and Infrastructure) Program Initiation (Milestone B).<br>***FY 2019 Base Plans:***<br>Conduct Government Production First Article acceptance test and preparation for Full Rate Production. Milestone Authority approval for Advanced EOD Robotics System (AEODRS) Inc 3, Milestone B. Complete technical re-fresh plans and engineering improvements plans for AEODRS increments.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Decrease from FY18 to FY19 is in accordance with planned program profile and is not due to a negative action against this effort for continued development for Advanced EOD Robotics Systems Inc 2 and Advanced EOD Robotics Systems Inc 3 Offset. | | | | | |
| ***Title:*** TCM AN/PLT-XXX SYSTEMS | 1.280 | 1.320 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Develop and upgrade threat loadset to remain current with continually changing threats.<br>***FY 2019 Base Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603654N / *JT Service Explosive Ordn Dev* | **Project (Number/Name)**<br>0377 / *JT Service Expl Ord Disp System* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Technical adjustment to Project 3177. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Technical Adjustment to Project 3177. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 13.540 | 13.572 | 7.839 | 0.000 | 7.839 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • OPN/5509(a): *EOD Equipment (VN075)* | 6.355 | 0.000 | 8.506 | - | 8.506 | 9.237 | 5.579 | 5,771.000 | 6.039 | 0.000 | 5,828.599 |

**Remarks**

**D. Acquisition Strategy**

Joint Service acquisition strategies utilize an evolutionary open architecture and modular strategy for rapid acquisition of mature technology for the user. The evolutionary approach delivers baseline capability and subsequent increments, recognizing up front the need for future capability improvements. Each increment is a militarily useful and supportable operational capability that can be developed, produced, deployed, and sustained. The evolutionary open architecture and modular strategy allows for rapid block upgrades, pre-planned product improvements, new accessories that expand range of military operations that provide a significant increase in operational capability and improvements at the modular level and encourages competition and second sources to lower life cycle costs. Once deployed, the upgrades can be developed, tested and deployed at the modular level and new capabilities can be delivered without having to return the entire tool (e.g. robot) to a depot for system level conversion. System Test bed and modeling and simulation can verify module system level compliance in a laboratory, greatly reducing the cost to conduct expensive range testing. Analysis of Alternatives (AOA) studies are conducted prior to the initiation of new subprojects. The AOA addresses and emphasizes acquisition strategies of the most cost-effective solution over the subprojects' life-cycle. Contracting for RDT&E, if required, is always competitive and when feasible, production options are included.

**E. Performance Metrics**

Processed 40 functional & 113 Maintenance Joint Service EOD Decision Support System (DSS) change requests resulting of 4,264 sets of Mobile Field Kit Software, 4,264 Unclassified and Secret AEODPS. Completed migration to Microsoft Windows 10 Operating System on Joint EOD DSS Node 4 Common Controller and completed the unclassified configuration of the JEOD DSS N4 CC.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603654N / *JT Service Explosive Ordn Dev* | Project (Number/Name)<br>0377 / *JT Service Expl Ord Disp System* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Primary Hardware Development | WR | NSWCIHEODTD : Indian Head, MD | 185.244 | 8.165 | Oct 2016 | 2.947 | Nov 2017 | 1.000 | Nov 2018 | - | | 1.000 | Continuing | Continuing | Continuing |
| Primary Hardware Development | C/FFP | Northrop Grumman : Herdon, VA | 9.044 | 3.500 | Dec 2016 | 0.000 | | 0.000 | Nov 2018 | - | | 0.000 | Continuing | Continuing | Continuing |
| Primary Hardware Development | C/FFP | TBD : TBD | 0.000 | 0.000 | Jun 2017 | 8.500 | Nov 2017 | 4.847 | Nov 2018 | - | | 4.847 | 0.000 | 13.347 | - |
| ILS | WR | EODTD : Indiah Head, MD | 48.590 | 0.500 | Oct 2016 | 0.400 | Nov 2017 | 0.300 | Nov 2018 | - | | 0.300 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 242.878 | 12.165 | | 11.847 | | 6.147 | | - | | 6.147 | Continuing | Continuing | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management Support | C/CPFF | HARRIS : Herndon, VA | 8.008 | 0.300 | Nov 2016 | 0.375 | Nov 2017 | 0.367 | Nov 2018 | - | | 0.367 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 8.008 | 0.300 | | 0.375 | | 0.367 | | - | | 0.367 | Continuing | Continuing | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Developmental Test & Evaluation | WR | EODTD : Indian Head, MD | 76.469 | 0.850 | Nov 2016 | 0.900 | Nov 2017 | 0.900 | Dec 2018 | - | | 0.900 | Continuing | Continuing | Continuing |
| Operation Test & Evaluation | WR | EODTD : Indian Head, MD | 11.483 | 0.025 | Nov 2016 | 0.025 | Nov 2017 | 0.025 | Nov 2018 | - | | 0.025 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 87.952 | 0.875 | | 0.925 | | 0.925 | | - | | 0.925 | Continuing | Continuing | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603654N / *JT Service Explosive Ordn Dev* | **Project (Number/Name)**<br>0377 / *JT Service Expl Ord Disp System* |

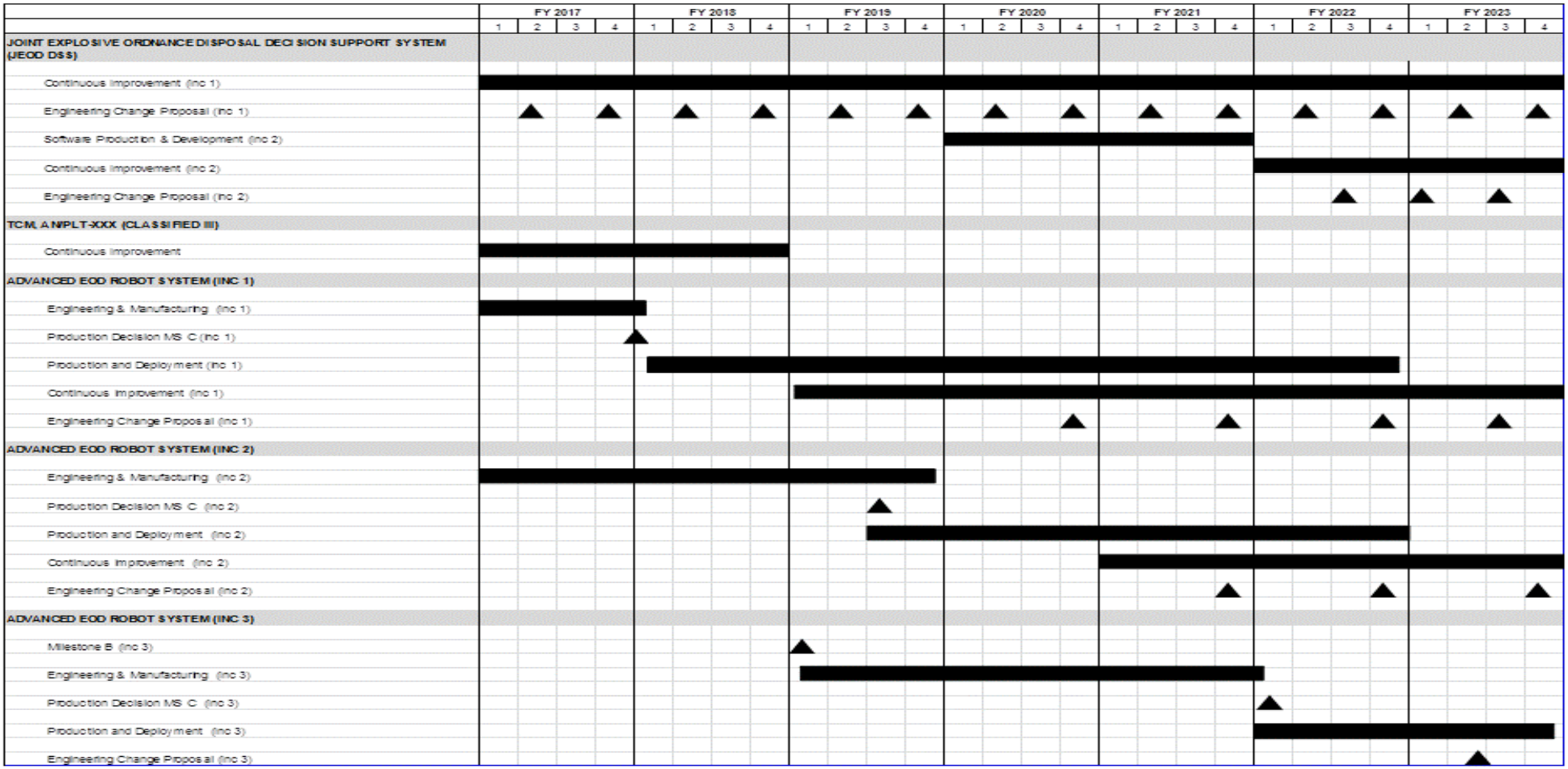
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Manangement Support | WR | EODTD : Indian Head, MD | 10.209 | 0.200 | Oct 2016 | 0.425 | Nov 2017 | 0.400 | Nov 2018 | - | | 0.400 | Continuing | Continuing | Continuing |
| Miscellaneous | WR | EODTD : Indian Head, MD | 16.452 | 0.000 | | 0.000 | | 0.000 | Nov 2018 | - | | 0.000 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 26.661 | 0.200 | | 0.425 | | 0.400 | | - | | 0.400 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 365.499 | 13.540 | | 13.572 | | 7.839 | | - | | 7.839 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603654N / *JT Service Explosive Ordn Dev* | **Project (Number/Name)**<br>0377 / *JT Service Expl Ord Disp System* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603654N / *JT Service Explosive Ordn Dev* | **Project (Number/Name)**<br>0377 / *JT Service Expl Ord Disp System* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 0377*** | | | | |
| JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Continuous Improvement (Inc 1) | 1 | 2017 | 4 | 2023 |
| JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 1 (Inc 1) | 2 | 2017 | 2 | 2017 |
| JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 2 (Inc 1) | 4 | 2017 | 4 | 2017 |
| JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 3 (Inc 1) | 2 | 2018 | 2 | 2018 |
| JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 4 (Inc 1) | 4 | 2018 | 4 | 2018 |
| JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 5 (Inc 1) | 2 | 2019 | 2 | 2019 |
| JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 6 (Inc 1) | 4 | 2019 | 4 | 2019 |
| JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 7 (Inc 1) | 2 | 2020 | 2 | 2020 |
| JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 8 (Inc 1) | 4 | 2020 | 4 | 2020 |
| JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 9 (Inc 1) | 2 | 2021 | 2 | 2021 |
| JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 10 (Inc 1) | 4 | 2021 | 4 | 2021 |
| JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 11 (Inc 1) | 2 | 2022 | 2 | 2022 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603654N / *JT Service Explosive Ordn Dev* | **Project (Number/Name)**<br>0377 / *JT Service Expl Ord Disp System* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 12 (Inc 1) | 4 | 2022 | 4 | 2022 |
| JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 13 (Inc 1) | 2 | 2023 | 2 | 2023 |
| JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 14 (Inc 1) | 4 | 2023 | 4 | 2023 |
| JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Software Production & Development (Inc 2) | 1 | 2020 | 4 | 2021 |
| JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Continuous Improvement (Inc 2) | 1 | 2022 | 4 | 2023 |
| JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 1 (Inc 2) | 3 | 2022 | 3 | 2022 |
| JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 2 (Inc 2) | 1 | 2023 | 1 | 2023 |
| JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 3 (Inc 2) | 3 | 2023 | 3 | 2023 |
| TCM, AN/PLT-XXX (CLASSIFIED III): Continuous Improvement | 1 | 2017 | 4 | 2018 |
| ADVANCED EOD ROBOT SYSTEM (INC 1): Engineering & Manufacturing (Inc 1) | 1 | 2017 | 1 | 2018 |
| ADVANCED EOD ROBOT SYSTEM (INC 1): Production Decision MS C (Inc 1) | 4 | 2017 | 1 | 2018 |
| ADVANCED EOD ROBOT SYSTEM (INC 1): Production and Deployment (Inc 1) | 1 | 2018 | 4 | 2022 |
| ADVANCED EOD ROBOT SYSTEM (INC 1): Continuous Improvement (Inc 1) | 1 | 2019 | 4 | 2023 |
| ADVANCED EOD ROBOT SYSTEM (INC 1): Engineering Change Proposal (Inc 1) 1 | 4 | 2020 | 4 | 2020 |
| ADVANCED EOD ROBOT SYSTEM (INC 1): Engineering Change Proposal (Inc 1) 2 | 4 | 2021 | 4 | 2021 |
| ADVANCED EOD ROBOT SYSTEM (INC 1): Engineering Change Proposal (Inc 1) 3 | 4 | 2022 | 4 | 2022 |
| ADVANCED EOD ROBOT SYSTEM (INC 1): Engineering Change Proposal (Inc 1) 4 | 4 | 2023 | 4 | 2023 |
| ADVANCED EOD ROBOT SYSTEM (INC 2): Engineering & Manufacturing (Inc 2) | 1 | 2017 | 4 | 2019 |
| ADVANCED EOD ROBOT SYSTEM (INC 2): Production Decision MS C (Inc 2) | 3 | 2019 | 3 | 2019 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603654N / *JT Service Explosive Ordn Dev* | **Project (Number/Name)**<br>0377 / *JT Service Expl Ord Disp System* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ADVANCED EOD ROBOT SYSTEM (INC 2): Production and Deployment (Inc 2) | 3 | 2019 | 4 | 2022 |
| ADVANCED EOD ROBOT SYSTEM (INC 2): Continuous Improvement (Inc 2) | 1 | 2021 | 4 | 2023 |
| ADVANCED EOD ROBOT SYSTEM (INC 2): Engineering Change Proposal (Inc 2) 1 | 4 | 2021 | 4 | 2021 |
| ADVANCED EOD ROBOT SYSTEM (INC 2): Engineering Change Proposal (Inc 2) 2 | 4 | 2022 | 4 | 2022 |
| ADVANCED EOD ROBOT SYSTEM (INC 2): Engineering Change Proposal (Inc 2) 3 | 4 | 2023 | 4 | 2023 |
| ADVANCED EOD ROBOT SYSTEM (INC 3): Milestone B (Inc 3) | 1 | 2019 | 1 | 2019 |
| ADVANCED EOD ROBOT SYSTEM (INC 3): Engineering & Manufacturing (Inc 3) | 1 | 2019 | 1 | 2022 |
| ADVANCED EOD ROBOT SYSTEM (INC 3): Production Decision MS C (Inc 3) | 1 | 2022 | 1 | 2022 |
| ADVANCED EOD ROBOT SYSTEM (INC 3): Production and Deployment (Inc 3) | 1 | 2022 | 4 | 2023 |
| ADVANCED EOD ROBOT SYSTEM (INC 3): Engineering Change Proposal (Inc 3) | 2 | 2023 | 3 | 2023 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603654N / *JT Service Explosive Ordn Dev* | Project (Number/Name)<br>1317 / *EOD Diving System* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1317: *EOD Diving System* | 107.448 | 6.467 | 5.113 | 4.357 | - | 4.357 | 4.527 | 4.621 | 3.977 | 4.816 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

These resources support the development of equipment for the Navy's only comprehensive expeditionary detect to engage MCM capability, i.e. Ex MCM Company. Specifically, it provides for development of Diver Safety/Life Support Equipment, Advanced Diver Integrated Sensors and Advanced Firing Systems to support Navy Explosive Ordnance Disposal (EOD) underwater operations and Expeditionary MCM Company establishment by US Fleet Forces Command. The equipment must have inherently low acoustic and magnetic signatures in order to allow the EOD divers to safely approach, render-safe, recover, exploit, and dispose of underwater explosive threats to include sea mines, limpet mines, underwater improvised explosive devices, and unexploded ordnance. Note: The schedules have been re-formatted to allow for better communication of program execution.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** DIVER SAFETY & LIFE SUPPORT SYSTEMS | 4.281 | 2.950 | 2.000 | 0.000 | 2.000 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Diver Safety & Life Support Systems: Develop diver safety tools to include more capable life support systems for EOD, and Mobile Diving & Salvage Units (MDSU) operations. Specific tools include but are not limited to Underwater Breathing Apparatus (UBA), specialized dive masks, heads-up displays, emergency life support systems and the ability to train divers and to evaluate Mine Countermeasures (MCM)/Explosive Ordnance Disposal (EOD) tools, tactics and procedures with regard to influence cleanliness against sea mines both at home and in controlled threat areas prior to commencing EOD operations. | | | | | |
| ***FY 2018 Plans:***<br>The MMUBA will receive an acquisition designation and achieve MS B in FY 2018. Development contract will be awarded to deliver EDMs for test and evaluation. Complete fielding of METRES improvements. | | | | | |
| ***FY 2019 Base Plans:***<br>FY19 efforts will focus on continuation of the MMUBA acquisition program (MOTS UBA, MMUBA, MK 16 PIP) and diver safety life support enhancements identified through continued engagement with Fleet EOD diving and expeditionary salvage forces. | | | | | |
| ***FY 2019 OCO Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603654N / *JT Service Explosive Ordn Dev* | **Project (Number/Name)**<br>1317 / *EOD Diving System* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Decrease from FY18 to FY19 is in accordance with planned program profile and is not due to a negative action against this effort based on FY18 completion of assessment and evaluation of Commercial Off-the-Shelf (COTS) diving rigs and FY18 execution of assessment, evaluation and selection of Multi Mission Underwater Breathing Apparatus. | | | | | |
| ***Title:*** ADVANCED DIVER INTEGRATED SENSORS<br>***Articles:***<br><br>***Description:*** Develop Advanced Diver Integrated Sensors equipment to enhance EOD and MDSU ability to detect, access, neutralize and gather intelligence on underwater targets of interest. Requirements include STRIDENT and improvements to the MK 15 Underwater Imaging System (UIS).<br><br>***FY 2018 Plans:***<br>In FY18, the ACAT designation and Milestone B will be realized and STRIDENT Engineering Development Model (EDM) contract will be awarded. EDM development and fabrication will commence with testing by the by the manufacturer continuing through of FY 2018. Continue to enhance the MK 15 Mod UIS diver-based search capability through fleet-based product improvements.<br><br>***FY 2019 Base Plans:***<br>FY19 efforts will focus on completing the initial enhancements needed to continue MK 15 UIS capability until STRIDENT capability is fielded. Continue development, testing, and evaluation of STRIDENT EDMs.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No significant change from FY 2018 to FY 2019. | 1.897<br>- | 1.920<br>- | 1.958<br>- | 0.000<br>- | 1.958<br>- |
| ***Title:*** ADVANCED FIRING SYSTEM<br>***Articles:***<br><br>***Description:*** Develops product improvements to existing systems for below and above water neutralization of underwater threats to support EOD and MDSU operations.<br><br>***FY 2018 Plans:*** | 0.289<br>- | 0.243<br>- | 0.399<br>- | 0.000<br>- | 0.399<br>- |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603654N / *JT Service Explosive Ordn Dev* | **Project (Number/Name)**<br>1317 / *EOD Diving System* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Continue development and testing of product improvements to AFD receiver subsystems.<br>***FY 2019 Base Plans:***<br>FY19 efforts will focus on continuing development, testing, and evaluation of product improvements to the Mk 12 AFS receiver subsystems.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No significant change from FY 2018 to FY 2019. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 6.467 | 5.113 | 4.357 | 0.000 | 4.357 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • OPN/0977a: *Underwater EOD Program (Cost Code UQ034)* | 1.730 | 1.100 | 1.125 | - | 1.125 | 1.350 | 2.095 | 6.622 | 6.754 | 0.000 | 47.521 |
| • OPN/0977b: *UW EOD (UQ036)* | 0.411 | 0.475 | 0.660 | - | 0.660 | 0.660 | 0.660 | 4.050 | 4.131 | 0.000 | 14.585 |

**Remarks**

**D. Acquisition Strategy**

Analysis of Alternatives (AOA) studies are always conducted prior to the initiation of new sub-projects. The AOA addresses and emphasizes acquisition strategies of the most cost-effective solution over the sub-projects life-cycle. The acquisition strategies observe the following hierarchy of alternatives: commercial item (including modification), non-developmental item (including modification), and lastly, developmental programs. Contracting for RDT&E, if required, is always competitive and when feasible, production options are included.

**E. Performance Metrics**

Research and Develop technologies for the design of Diver Safety Systems, Advanced Diver Integrated Sensors and Advanced Underwater Firing Systems used to render safe, recover, exploit, and dispose of sea limpet mines and unexploded ordnance.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603654N / *JT Service Explosive Ordn Dev* | Project (Number/Name)<br>1317 / *EOD Diving System* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Primary Hardware Development | WR | Multiple Activities : Not Specified | 42.103 | 2.047 | Oct 2016 | 0.950 | Oct 2017 | 0.850 | Nov 2018 | - | | 0.850 | Continuing | Continuing | Continuing |
| Software Development | WR | Multiple Activites : Not Specified | 5.094 | 1.439 | Oct 2016 | 0.208 | Oct 2017 | 0.170 | Nov 2018 | - | | 0.170 | Continuing | Continuing | Continuing |
| Systems Engineering | WR | Multiple Activities : Not Specified | 8.228 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 8.228 | - |
| ILS | WR | Multiple Activies : Not Specified | 11.916 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 11.916 | - |
| Systems Engineering | WR | NSWC : Panama City | 2.228 | 0.617 | Oct 2016 | 0.879 | Oct 2017 | 0.702 | Nov 2018 | - | | 0.702 | Continuing | Continuing | Continuing |
| Systems Engineering | WR | SPAWAR : San Diego | 3.634 | 0.376 | Oct 2016 | 1.189 | Oct 2017 | 0.970 | Nov 2018 | - | | 0.970 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 73.203 | 4.479 | | 3.226 | | 2.692 | | - | | 2.692 | Continuing | Continuing | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management Support1 | C/CPFF | HARRIS : Herndon VA | 3.537 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.537 | - |
| Program Management Support2 | C/CPFF | HARRIS : Herndon VA | 3.871 | 0.530 | Oct 2016 | 0.510 | Nov 2017 | 0.450 | Nov 2018 | - | | 0.450 | Continuing | Continuing | Continuing |
| Integrated Logistics Support | WR | Not Specified : Not Specified | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | - |
| Configuration Management | WR | Not Specified : Not Specified | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | - |
| Technical Data | WR | Not Specified : Not Specified | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | - |
| GFE | WR | Not Specified : Not Specified | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | - |
| Award Fees | WR | Not Specified : Not Specified | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603654N / *JT Service Explosive Ordn Dev* | Project (Number/Name)<br>1317 / *EOD Diving System* | |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Subtotal** | 7.408 | 0.530 | | 0.510 | | 0.450 | | - | | 0.450 | Continuing | Continuing | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Development Test & Evaluation | WR | Multiple Activities : Not Specified | 8.180 | 0.719 | Oct 2016 | 0.663 | Oct 2017 | 0.585 | Nov 2018 | - | | 0.585 | Continuing | Continuing | Continuing |
| Operational Test & Evaluation | WR | Multiple Activities : Not Specified | 1.560 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.560 | - |
| | | **Subtotal** | 9.740 | 0.719 | | 0.663 | | 0.585 | | - | | 0.585 | Continuing | Continuing | N/A |

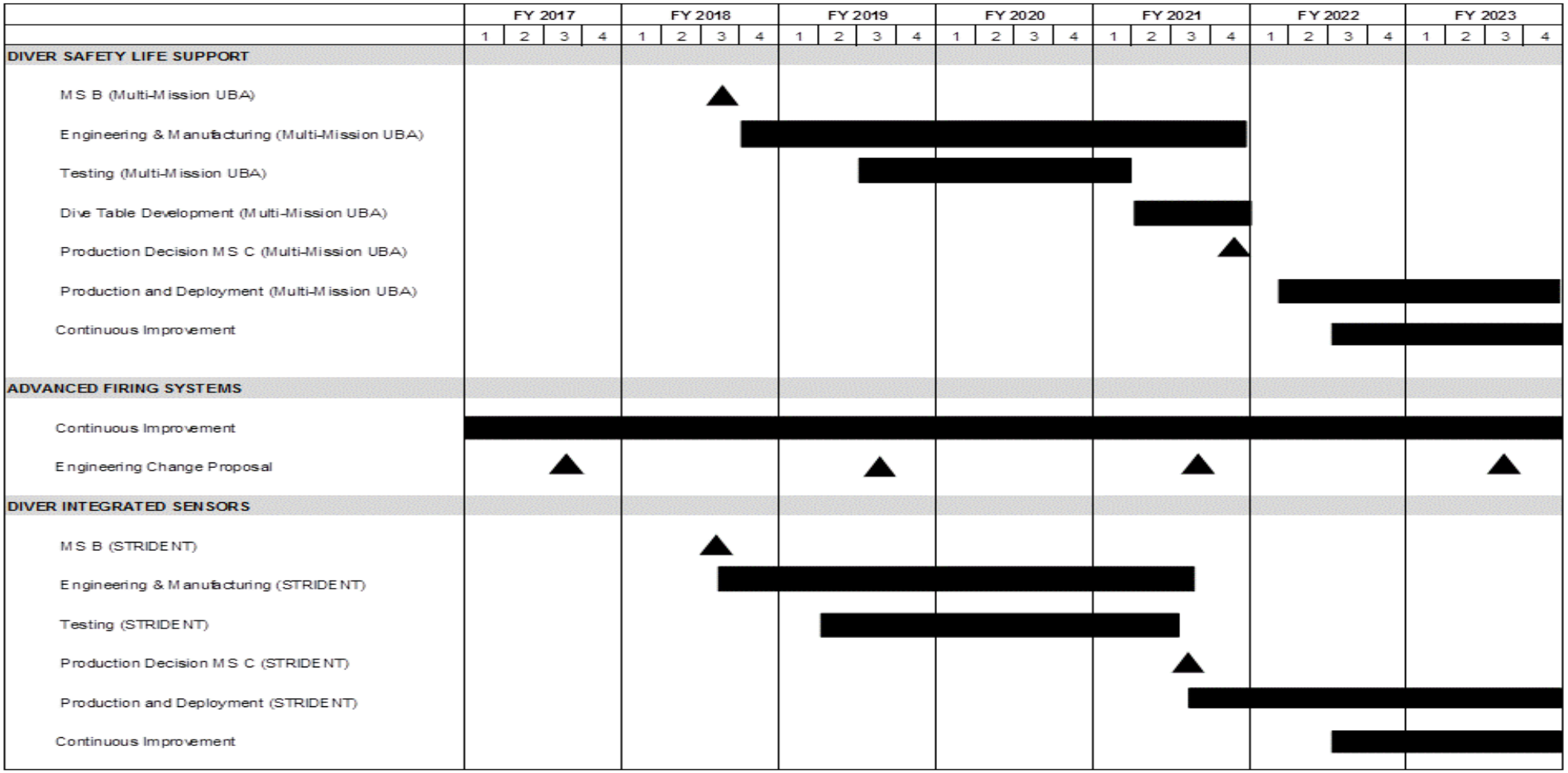
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management Support | WR | EODTECHDIV : IH MD | 10.141 | 0.717 | Oct 2016 | 0.693 | Nov 2017 | 0.611 | Nov 2018 | - | | 0.611 | 0.000 | 12.162 | - |
| Miscellaneous | WR | NSWC, Activities : Not Specified | 6.943 | 0.022 | Oct 2016 | 0.021 | Nov 2017 | 0.019 | Nov 2018 | - | | 0.019 | 0.000 | 7.005 | - |
| Acquisition Workforce Fund | Various | Various : Various | 0.013 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.013 | - |
| | | **Subtotal** | 17.097 | 0.739 | | 0.714 | | 0.630 | | - | | 0.630 | 0.000 | 19.180 | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 107.448 | 6.467 | | 5.113 | | 4.357 | | - | | 4.357 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603654N / *JT Service Explosive Ordn Dev* | **Project (Number/Name)**<br>1317 / *EOD Diving System* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603654N / *JT Service Explosive Ordn Dev* | **Project (Number/Name)**<br>1317 / *EOD Diving System* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 1317*** | | | | |
| TITLE: DIVER SAFETY LIFE SUPPORT | 1 | 2017 | 4 | 2023 |
| ---MS B (Multi-Mission UBA) | 3 | 2018 | 3 | 2018 |
| ---Engineering & Manufactoring (Multi-Mission UBA) | 4 | 2018 | 4 | 2021 |
| ---Testing (Multi-Mission UBA) | 3 | 2019 | 1 | 2021 |
| ---Dive Table Development (Multi-Mission UBA) | 2 | 2021 | 4 | 2021 |
| ---Production Decision MS C (Multi-Mission UBA) | 4 | 2021 | 4 | 2021 |
| ---Production and Deployment (Multi-Mission UBA) | 2 | 2022 | 4 | 2023 |
| ---Continuous Improvement_ | 3 | 2022 | 4 | 2023 |
| TITLE: ADVANCED FIRING SYSTEMS | 1 | 2017 | 4 | 2023 |
| ---Continuous Improvement. | 1 | 2017 | 4 | 2023 |
| ---Engineering Change Proposal 1 | 3 | 2017 | 3 | 2017 |
| ---Engineering Change Proposal 2 | 3 | 2019 | 3 | 2019 |
| ---Engineering Change Proposal 3 | 3 | 2021 | 3 | 2021 |
| ---Engineering Change Proposal 4 | 3 | 2023 | 3 | 2023 |
| TITLE: DIVER INTEGRATED SENSORS | 1 | 2017 | 4 | 2023 |
| ---MS B (STRIDENT) | 3 | 2018 | 3 | 2018 |
| ---Engineering & Manufacturing (STRIDENT) | 3 | 2018 | 3 | 2021 |
| ---Testing (STRIDENT) | 2 | 2019 | 2 | 2021 |
| ---Production Decision MS C (STRIDENT) | 3 | 2021 | 3 | 2021 |
| ---Production and Deployment (STRIDENT) | 4 | 2021 | 4 | 2023 |
| ---Continuous Improvement- | 3 | 2022 | 4 | 2023 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603654N / *JT Service Explosive Ordn Dev* | Project (Number/Name)<br>3177 / *Joint Counter Radio-Controlled IED Elec Warfare* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3177: *Joint Counter Radio-Controlled IED Elec Warfare* | 0.000 | 13.194 | 45.264 | 14.016 | 13.900 | 27.916 | 11.414 | 11.731 | 9.755 | 12.155 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Provides for the research and development of Electronic Warfare (EW) systems, equipment, procedures, and tactical aids for all military services against the threat posed by Radio-Controlled Improvised Explosive Devices (RCIEDs) and to prevent initiation of RCIEDs across the spectrum of Joint military operations. Utilize Joint requirements to provide a system of systems approach for a suite of equipment for mounted, dismounted, and fixed site operations; provide a Joint Counter RCIED EW (JCREW) development of equipment, procedures, and tactical aids to make rapid improvements to performance, supportability and affordability, while maintaining pace with evolving global threat.

Also provides for the rapid development and testing of JCREW Counter-Unmanned Aerial System (C-UAS) for Joint Urgent Operational Need Statement (JUON) CC-0558. This includes the modification of JCREW software, threat loads, and advanced techniques to provide an Increment I C-UAS capability, integration into JCREW dismounted systems delivered off the LRIP contract, lab verification, and open air testing. Due to rapidly evolving threats team will develop and support additional software drops throughout year.

The JCREW system, Increment 1 Block 1 (I1B1) is the next generation of counter RCIED systems. This family of systems includes fixed site, mounted and dismounted units, which provide countermeasures against the global RCIED threat. Key system design features include significant performance increases over current legacy systems, a modular open architecture system to address current and future advanced threats, robust information assurance and security, and is net-capable for improved Communications and Control (C2). JCREW I1B1 supports global deployment and sustainment for all combatant commands providing increased protection to Warfighter against the evolving worldwide RCIED threats.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Joint Counter Radio-Controlled IED Elec Warfare | 13.194 | 45.264 | 13.070 | 13.900 | 26.970 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Supports the design, integration and test of Tech Insertion hardware, software, and advanced techniques into JCREW systems. Tech Insertion candidates include ONR sponsored technologies ready for transition to JCREW, and techniques, hardware and software performance improvements developed by Navy laboratories, FFRDCs, UARCs, and the JCREW Prime contractor. Analysis of Alternatives will be conducted to evaluate and select Tech Insertion candidates based on technical maturity, cost, and performance. Hardware and software updates will be designed, tested, and implemented into JCREW through Engineering Change | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603654N / *JT Service Explosive Ordn Dev* | **Project (Number/Name)**<br>3177 / *Joint Counter Radio-Controlled IED Elec Warfare* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Proposals. Also provides for the rapid development and testing of JCREW Counter-Unmanned Aerial System (C-UAS) for Joint Urgent Operational Need(JUON) CC-0558.<br><br>***FY 2018 Plans:***<br>Complete Analysis of Alternatives for Tech Insertion 2. Begin product development of Tech Insertion 2. Continue development and testing of threat loads and software and hardware Engineering Change Proposals (ECPs) in support of C-UAS JUON CC-0558.<br><br>***FY 2019 Base Plans:***<br>Perform and complete Tech Refresh development, implementation and testing for Tech Insertion 2. Begin Analysis of Alternatives for Tech Insertion 3. Continue development and testing of threat loads, software, and hardware and processing the associated Engineering Change Proposals (ECPs) in support of support of C-UAS JUON CC-0558.<br><br>***FY 2019 OCO Plans:***<br>FY2019 OCO $12.9M funding supports Navy assigned requirement to provide C-UAS capability in response to JUON CC-0558. Thirty C-UAS systems have been fielded to date to provide a rapid response initial capability, with additional systems planned per the JUON. Enhanced performance will be required to maintain capability against the evolving UAS threat. These enhancements will require development and testing of hardware and software/firmware upgrades, and integration of C-UAS capability on various platforms, to include small combatant craft, ships, and fixed site infrastructure.<br><br>Additional $1M OCO funds provide HEMLOCK project with required software upgrades to enable enhanced cyber and electronics forensics and exploitation of RCIED threats. Further information on Hemlock available at a higher classification.<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Decrease from FY18 to FY19 is in accordance with planned program profile and is not due to a negative action against this effort primarily due to completion of major efforts in FY18 supporting Joint Urgent Operational Need (CC-0558) for Counter Unmanned Aerial Systems (CUAS). | | | | | |
| ***Title:*** EOD CREW | 0.000 | 0.000 | 0.946 | 0.000 | 0.946 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603654N / *JT Service Explosive Ordn Dev* | **Project (Number/Name)**<br>3177 / *Joint Counter Radio-Controlled IED Elec Warfare* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A<br>***FY 2019 Base Plans:***<br>Develop AN/PLT-5 load sets for fielded EOD TCM systems to remain current with continually changing threats, both CONUS and OCONUS. Develop AN/PLT-4 replacement.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Technical Adjustment from Project Unit 0377. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 13.194 | 45.264 | 14.016 | 13.900 | 27.916 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • OPN/5509(b): *Explosive Ordnance Disposal Equip* | 81.208 | 63.462 | 0.836 | 30.900 | 31.736 | 0.868 | 0.877 | 0.894 | 0.912 | 0.000 | 182.886 |

**Remarks**

PE 0604653N/JT Cntr Radio Controlled IED Elec War (JCREW) consolidated into PE 0603654N/JT Service Explosive Ordn Dev FY17 and out.

**D. Acquisition Strategy**

FRP Production Line Start Up and Ramp Up and FRP Organic Depot Line Startup and Ramp Up in FY 2017. Spares support and OEM Depot will be utilized during LRIP phase. Establishment of Organic Depot capability during LRIP phase in support of FRP Decision Review with Weapons System Support Center Mechanicsburg as Primary Inventory Control Activity (PICA). Full Rate Production contract will be full and open competition using LRIP final Tech Data Package (TDP) with unlimited data rights. Tech Insertion will help to maintain JCREW performance against evolving global RCIED threats.

**E. Performance Metrics**

LRIP contract awarded September 2015. Deliveries will support IOC. Analysis of Alternatives for Tech Insertion 1 in September 2015. Full Rate Production contract award planned for August 2017. Tech Insertion 2 development commences in FY18 based on outcome of Analysis of Alternatives.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603654N / *JT Service Explosive Ordn Dev* | **Project (Number/Name)**<br>3177 / *Joint Counter Radio-Controlled IED Elec Warfare* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Primary Hardware Development | Various | TBD : TBD | 0.000 | 1.929 | Nov 2016 | 8.615 | Jan 2018 | 3.105 | Jan 2019 | 2.526 | Jan 2019 | 5.631 | Continuing | Continuing | Continuing |
| Systems Engineering | Various | TBD : TBD | 0.000 | 3.464 | Nov 2016 | 3.452 | Jan 2018 | 1.350 | Jan 2019 | 1.260 | Jan 2019 | 2.610 | Continuing | Continuing | Continuing |
| Software Development | Various | TBD : TBD | 0.000 | 0.964 | Nov 2016 | 6.495 | Jan 2018 | 1.705 | Jan 2019 | 1.067 | Jan 2019 | 2.772 | Continuing | Continuing | Continuing |
| System Integration | Various | TBD : TBD | 0.000 | 0.964 | Nov 2016 | 1.952 | Jan 2018 | 1.300 | Jan 2019 | 1.152 | Jan 2019 | 2.452 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 7.321 | | 20.514 | | 7.460 | | 6.005 | | 13.465 | Continuing | Continuing | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Loadset Development | FFRDC | JHU/APL, MITRE: : Laurel, MD | 0.000 | 0.592 | Nov 2016 | 4.504 | Dec 2017 | 0.810 | Nov 2018 | 1.048 | Nov 2018 | 1.858 | Continuing | Continuing | Continuing |
| Systems Engineering | WR | NSWC: : Various | 0.000 | 2.242 | Nov 2016 | 7.179 | Nov 2017 | 2.986 | Nov 2018 | 3.900 | Nov 2018 | 6.886 | Continuing | Continuing | Continuing |
| Program Management Support | WR | IHEODTD: : Indian Head, MD | 0.000 | 0.331 | Nov 2016 | 1.241 | Nov 2017 | 0.270 | Nov 2018 | 0.375 | Nov 2018 | 0.645 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 3.165 | | 12.924 | | 4.066 | | 5.323 | | 9.389 | Continuing | Continuing | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Test & Evaluation | WR | NSWC : Various | 0.000 | 1.208 | Nov 2016 | 6.658 | Nov 2017 | 0.896 | Nov 2018 | 1.031 | Nov 2018 | 1.927 | Continuing | Continuing | Continuing |
| Test & Evaluation | MIPR | YPG : Yuma, Arizona | 0.000 | 0.850 | Nov 2016 | 3.398 | Nov 2017 | 1.365 | Nov 2018 | 1.241 | Nov 2018 | 2.606 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 2.058 | | 10.056 | | 2.261 | | 2.272 | | 4.533 | Continuing | Continuing | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603654N / *JT Service Explosive Ordn Dev* | **Project (Number/Name)**<br>3177 / *Joint Counter Radio-Controlled IED Elec Warfare* |

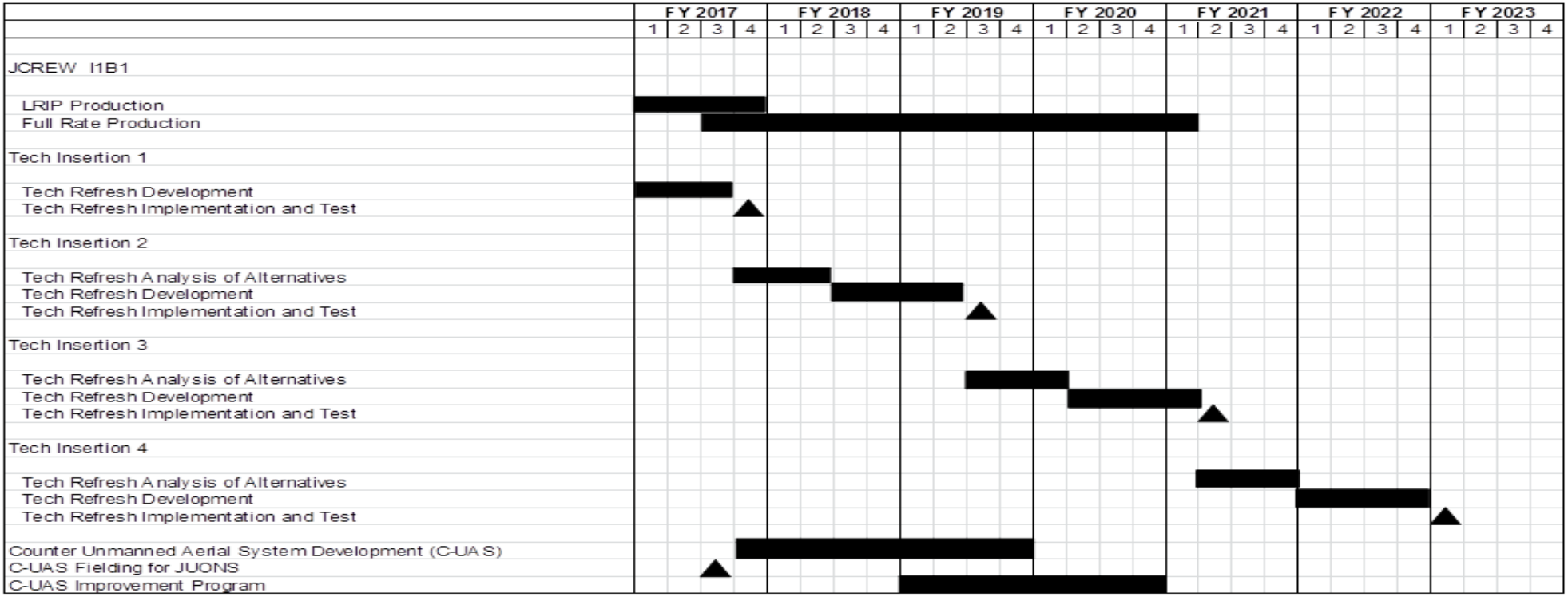
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management Support | C/CPFF | Cydecor : Various | 0.000 | 0.224 | Dec 2016 | 0.890 | Dec 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Miscellaneous | WR | NSWC : Various | 0.000 | 0.426 | Dec 2016 | 0.880 | Dec 2017 | 0.229 | Nov 2018 | 0.300 | Dec 2018 | 0.529 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.650 | | 1.770 | | 0.229 | | 0.300 | | 0.529 | Continuing | Continuing | N/A |

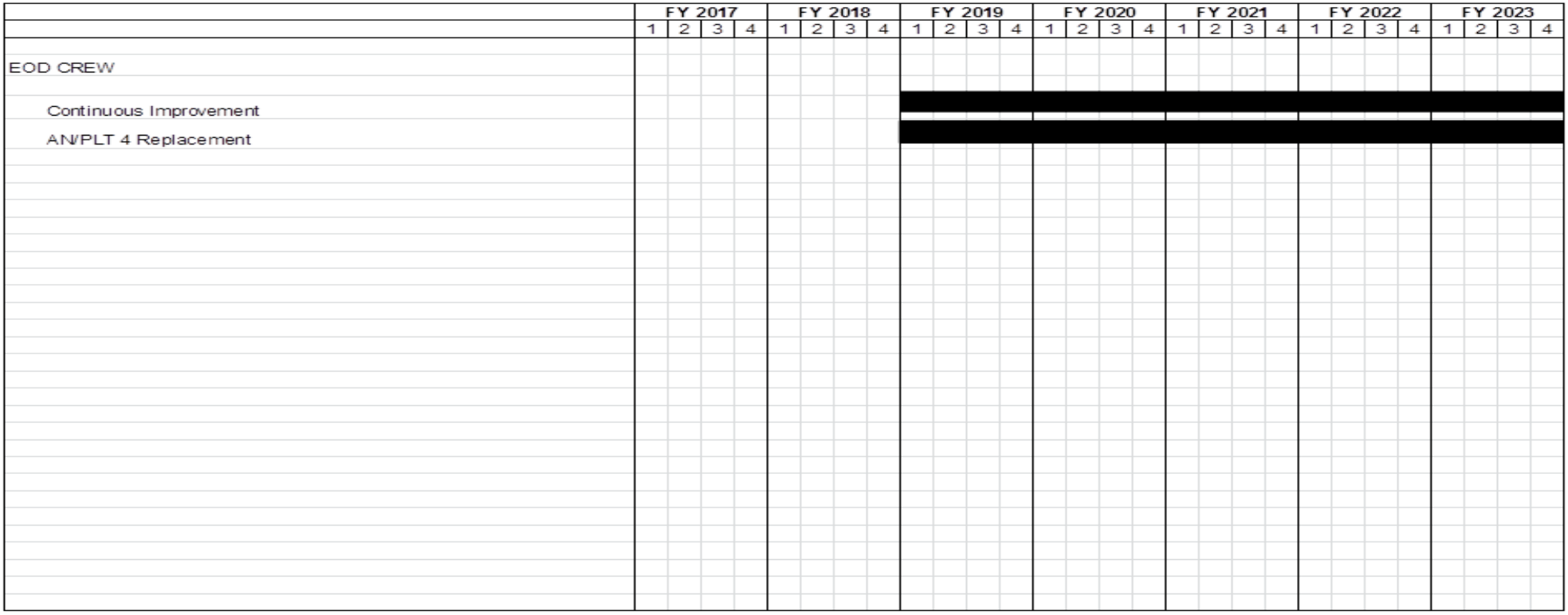
| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 13.194 | | 45.264 | | 14.016 | | 13.900 | | 27.916 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603654N / *JT Service Explosive Ordn Dev* | **Project (Number/Name)**<br>3177 / *Joint Counter Radio-Controlled IED Elec Warfare* |



| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603654N / *JT Service Explosive Ordn Dev* | **Project (Number/Name)**<br>3177 / *Joint Counter Radio-Controlled IED Elec Warfare* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603654N / *JT Service Explosive Ordn Dev* | **Project (Number/Name)**<br>3177 / *Joint Counter Radio-Controlled IED Elec Warfare* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3177*** | | | | |
| JCREW I1B1: LRIP Production | 1 | 2017 | 4 | 2017 |
| JCREW I1B1: Full Rate Production | 3 | 2017 | 1 | 2021 |
| JCREW I1B1: TECH INSERTION 1 | 1 | 2017 | 4 | 2017 |
| JCREW I1B1: Tech Refresh Development (1) | 1 | 2017 | 3 | 2017 |
| JCREW I1B1: Tech Refresh Implementation and Test (1) | 4 | 2017 | 4 | 2017 |
| JCREW I1B1: TECH INSERTION 2 | 4 | 2017 | 3 | 2019 |
| JCREW I1B1: Tech Refresh Analysis of Alternatives (2) | 4 | 2017 | 2 | 2018 |
| JCREW I1B1: Tech Refresh Development (2) | 3 | 2018 | 2 | 2019 |
| JCREW I1B1: Tech Refresh Implementation and Test (2) | 3 | 2019 | 3 | 2019 |
| JCREW I1B1: TECH INSERTION 3 | 3 | 2019 | 2 | 2021 |
| JCREW I1B1: Tech Refresh Analysis of Alternatives (3) | 3 | 2019 | 1 | 2020 |
| JCREW I1B1: Tech Refresh Development (3) | 2 | 2020 | 1 | 2021 |
| JCREW I1B1: Tech Refresh Implementation and Test (3) | 2 | 2021 | 2 | 2021 |
| JCREW I1B1: TECH INSERTION 4 | 2 | 2021 | 4 | 2022 |
| JCREW I1B1: Tech Refresh Analysis of Alternatives (4) | 2 | 2021 | 4 | 2021 |
| JCREW I1B1: Tech Refresh Development (4) | 1 | 2022 | 4 | 2022 |
| JCREW I1B1: Tech Refresh Implementation and Test (4) | 1 | 2023 | 1 | 2023 |
| JCREW I1B1: Counter Unmanned Aerial System Development | 3 | 2017 | 4 | 2019 |
| JCREW I1B1: C-UAS Fielding for JUONS | 3 | 2017 | 3 | 2017 |
| JCREW I1B1: C-UAS Improvement Program | 1 | 2019 | 4 | 2020 |
| EOD CREW: Continuous Improvement | 1 | 2019 | 4 | 2023 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603654N / *JT Service Explosive Ordn Dev* | **Project (Number/Name)**<br>3177 / *Joint Counter Radio-Controlled IED Elec Warfare* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| EOD CREW: AN/PLT 4 Replacement | 1 | 2019 | 4 | 2023 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603654N / *JT Service Explosive Ordn Dev* | Project (Number/Name)<br>4023 / *VSW MCM/Force Protection UUV* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4023: *VSW MCM/Force Protection UUV* | 109.817 | 15.485 | 19.118 | 16.936 | - | 16.936 | 17.592 | 15.995 | 15.872 | 18.726 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

This funding support the development of unmanned systems for the Navy's only fielded expeditionary unmanned underwater EOD and MCM capability. Specifically, it provides for development of affordable expeditionary, unmanned underwater systems to support Navy Expeditionary forces including Explosive Ordnance (EOD). Mobile Diving and Salvage Units, and Shallow Water (SW), Very Shallow Water (VSW) and Expeditionary Mine Countermeasures (ExMCM) mission operations. The equipment must be highly portable in order to support the Navy EOD technician to safely approach, render safe, recover, exploit and dispose of underwater explosive threats to include sea mines, limpet mines and unexploded ordnance. Provides support for the Navy's high priority missions of Maritime Homeland Defense, MCM, including clandestine reconnaissance and mine clearance in support of amphibious operations. Development of Expeditionary UUV systems to support localization render-safe and detailed intelligence gathering of UXO including Underwater Improvised Explosive Devices. This project supports CNO N957 MCM UUV Roadmap.

The increase in RDT&E resources from FY 2017 to FY 2018 provides the RDT&E resources needed to execute two formal MK 18 Family of Systems acquisition programs as well as three major engineering change proposals and the enhancement to the MK19 Family of Systems to provide an underwater threat interdiction capability. These efforts require prototype development and significant DT&E during FY 2018. FY 2018 program execution tempo reflects a significant increase in activity to support MK 18 UUV Increment II and EOD Response ROV capability development

FY 2018 will focus on completion of the development and testing of advanced sensors (SSAM and ATLAS) that will allow warfighters to detect, classify and localize high priority threats in meeting mine warfare missions. Also, resources will be used to expand deployability of the MK 18 Family of Systems abroad a higher number of shipboard platforms and also to deploy the family of systems from additional small boats other than the 11m RHIB. The Increment 1 MK 18 Mod 2 upgrade will allow implementation of Automated Target Recognition (ATR), advanced autonomy architecture and enhanced electro-optic sensor performance. Increment II will focus on improving MCM performance and reducing the tactical timeline through fielding a Reaquire, Identify and Mark capability for the MK 18 Mod 2 system. Concurrently with these efforts, the MK 18 Mod 1 is undergoing a configuration change that will provide a higher area coverage rate, inclusion of vehicle autonomy, and Automated Target Recognition. Additional efforts will execute the open competition process necessary to acquire and verify an EOD Response ROV capability focusing on user effectiveness and operational suitability.

These efforts will significantly improve the capabilities of the projected inventory of 48 MK 18 Mod 2 vehicles and 75 MK 18 Mod 1 vehicles for fleet expeditionary forces. Currently, the MK 18 Family of Systems are being employed in multiple theater of operations (5th, 6th and 7th Fleet) and have been continuously employed in multiple CONUS based port survey and maritime homeland defense as well.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603654N / *JT Service Explosive Ordn Dev* | **Project (Number/Name)**<br>4023 / *VSW MCM/Force Protection UUV* |

These resources also support the FY 2018 enhancement of the MK 19 Family of Systems, (i.e. a ROV based ship's hull search capability) as well as a MK 19 variant (i.e. a ROV based target interdiction capability) based on the previously conducted EUNS AoA. In FY 2018, the next generation (i.e. modified-off-the-shelf (MOTS) ROV) is being developed to decrease risk when reacquiring/investigating a potential threat (i.e. sea mine or underwater Improvised Explosive Device).

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** VSW MCM/Force Protection UUV | 15.485 | 19.118 | 16.936 | 0.000 | 16.936 |
| ***Articles:*** | - | - | - | - | - |

***Description:*** This program supports development, testing and Fleet approval for evolving generations of affordable, expeditionary Unmanned Underwater Vehicles (UUV), support equipment, and Common Operator Interface Navy (COIN) systems to address validated requirements in support of Expeditionary SW and VSW UMCM mission areas. Mission areas include: open and confined areas, hulls, piers and pilings to search, classify, map, re-acquire, identify, and neutralize sea and limpet mines and underwater improvised explosive devices.

***FY 2018 Plans:***
Continue testing evaluation, fielding and installation of MK 18 MOD 1 and MOD 2 UUV Systems to meet US Fleet Forces Command inventory objectives in support of the Expeditionary MCM Company capability establishment. The MK 18 Family of Systems will enter the Production/Deployment phase following a successful Milestone C decision for the MK 18 Mod 2 Increment 1 project. FY 18 efforts will continue in preparation for a production decision for the advanced sensors (i.e. ATLAS and SSAM); and the MK 18 Mod 2 Increment 2 project will enter the Engineering Development and Manufacturing phase. The MK 19 Engineering Change Proposal process will field a MOTS ROV prototype for DT&E, in FY 2018. FY18 efforts will also address development of synthetic training for the MK 18 FoS, enhanced C2 capability with mobile gateway buoy and HFGW and assessing system vulnerabilities thru penetration testing on the MK 18 FoS.

***FY 2019 Base Plans:***
FY19 efforts will focus on continued development and testing of MK 18 Mod 2 Increment II and MOTS ROV projects. Additionally, efforts to complete preliminary engineering change proposal actions necessary to transition technologies developed and demonstrated in the rapid innovation fund (RIF) and small business innovative research (SBIR) initiatives to initiate transition as incremental capability improvements to baseline MK 18 and MK 19 systems will continue. These capability improvements will form the developmental baseline for the Next Generation UUV system.

***FY 2019 OCO Plans:***

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603654N / *JT Service Explosive Ordn Dev* | **Project (Number/Name)**<br>4023 / *VSW MCM/Force Protection UUV* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Decrease from FY18 to FY19 is in accordance with planned program profile primarily related to FY18 completion of MK 18 Mod 2 UUV Increment I development and completion of prototype development and operational effectiveness and suitability testing of ATLAS advanced sensor. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 15.485 | 19.118 | 16.936 | 0.000 | 16.936 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • OPN/0977(a): *Underwater EOD Program (Cost Code UQ034)* | 22.110 | 34.124 | 27.620 | - | 27.620 | 20.970 | 21.235 | 14.339 | 14.316 | 0.000 | 274.402 |
| • OPN/0977(b): *Expeditionary Mine Countermeasures (ExMCM) (Cost Code UQ038)* | 0.000 | 15.412 | 33.932 | 6.700 | 40.632 | 1.150 | 0.591 | 0.603 | 0.615 | 0.000 | 59.003 |
| • OPN/0977 (c): *Naval Special Warfare (NSW) (Cost Code UQ039)* | 0.000 | 4.950 | 3.370 | 2.500 | 5.870 | 1.692 | 1.692 | 1.692 | 1.725 | 0.000 | 17.621 |

**Remarks**

**D. Acquisition Strategy**

Analysis of Alternatives (AOA) studies are always conducted prior to the initiation of new sub-projects. The AOA addresses and emphasizes acquisitions strategies of the most cost effective solution over the sub-projects' life -cycle. The acquisition strategies observe the following hierarchy of alternatives: commercial item (including modifications), non-developmental item (including modifications), and lastly, developmental programs. Contracting for RDT&E, if required is always competitive and when feasible, production options are included. This ongoing program capitalizes on a User Operational Evaluation System (UOES) effort involving Fleet operators engaged in tactical experimentation with prototype UUVs prior to fielding baseline systems and capability improvement package increments. These UUV operators also participate in detailed requirements analyses and definition. Operational capabilities with UUV have been realized at designated operational units, with a competitive acquisition strategy. The addition of enhanced capabilities through an evolutionary acquisition approach to the UUV toolbox is programmed for delivery in accordance with approved CNO requirements and ONR TTAs. Further improvements to the toolbox to add basic mine and underwater explosive threats neutralization capabilities will be pursued.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603654N / *JT Service Explosive Ordn Dev* | **Project (Number/Name)**<br>4023 / *VSW MCM/Force Protection UUV* |

**E. Performance Metrics**

Research and Develop technologies for the design of Expeditionary Unmanned Underwater Systems to provide enhanced fleet capabilities to locate, classify, identify, assess, neutralize and conduct post-neutralization battle damage assessment/verification of mines and unexploded ordnance in support of ExMCM and EOD Forces.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603654N / *JT Service Explosive Ordn Dev* | Project (Number/Name)<br>4023 / *VSW MCM/Force Protection UUV* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Primary Hardware Development | WR | Multiple Activities : Not Specified | 19.646 | 2.976 | Oct 2016 | 4.240 | Oct 2017 | 3.588 | Nov 2018 | - | | 3.588 | 0.000 | 30.450 | - |
| Systems Engineering | WR | NSWC Activities : Not Specified | 13.398 | 2.780 | Oct 2016 | 3.478 | Oct 2017 | 2.613 | Nov 2018 | - | | 2.613 | 0.000 | 22.269 | - |
| Primary Hardware Development | WR | NSWC IH : IH, MD | 16.238 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Systems Engineering | WR | NSWC, Activities : Not Specified | 21.659 | 2.686 | Oct 2016 | 3.152 | Oct 2017 | 2.761 | Nov 2018 | - | | 2.761 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 70.941 | 8.442 | | 10.870 | | 8.962 | | - | | 8.962 | Continuing | Continuing | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Technical Support | C/CPFF | HARRIS : Herndon, VA | 5.676 | 0.586 | Oct 2016 | 0.572 | Nov 2017 | 0.583 | Nov 2018 | - | | 0.583 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 5.676 | 0.586 | | 0.572 | | 0.583 | | - | | 0.583 | Continuing | Continuing | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Developmental Test & Evaluation | WR | NSWC Activites : Not Specified | 13.452 | 3.519 | Oct 2016 | 3.844 | Oct 2017 | 3.681 | Nov 2018 | - | | 3.681 | 0.000 | 24.496 | - |
| Operational Test & Evaluation | WR | NSWC Activities : Not Specified | 2.957 | 1.354 | Oct 2016 | 1.785 | Oct 2017 | 1.763 | Nov 2018 | - | | 1.763 | 0.000 | 7.859 | - |
| Developmental Test & Evaluation | WR | NSWC Activities : Not Specified | 8.994 | 1.151 | Oct 2016 | 1.284 | Oct 2017 | 1.269 | Nov 2018 | - | | 1.269 | Continuing | Continuing | Continuing |
| Operational Test & Evaluation | WR | NSWC IH : IH, MD | 1.424 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 26.827 | 6.024 | | 6.913 | | 6.713 | | - | | 6.713 | Continuing | Continuing | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603654N / *JT Service Explosive Ordn Dev* | **Project (Number/Name)**<br>4023 / *VSW MCM/Force Protection UUV* |

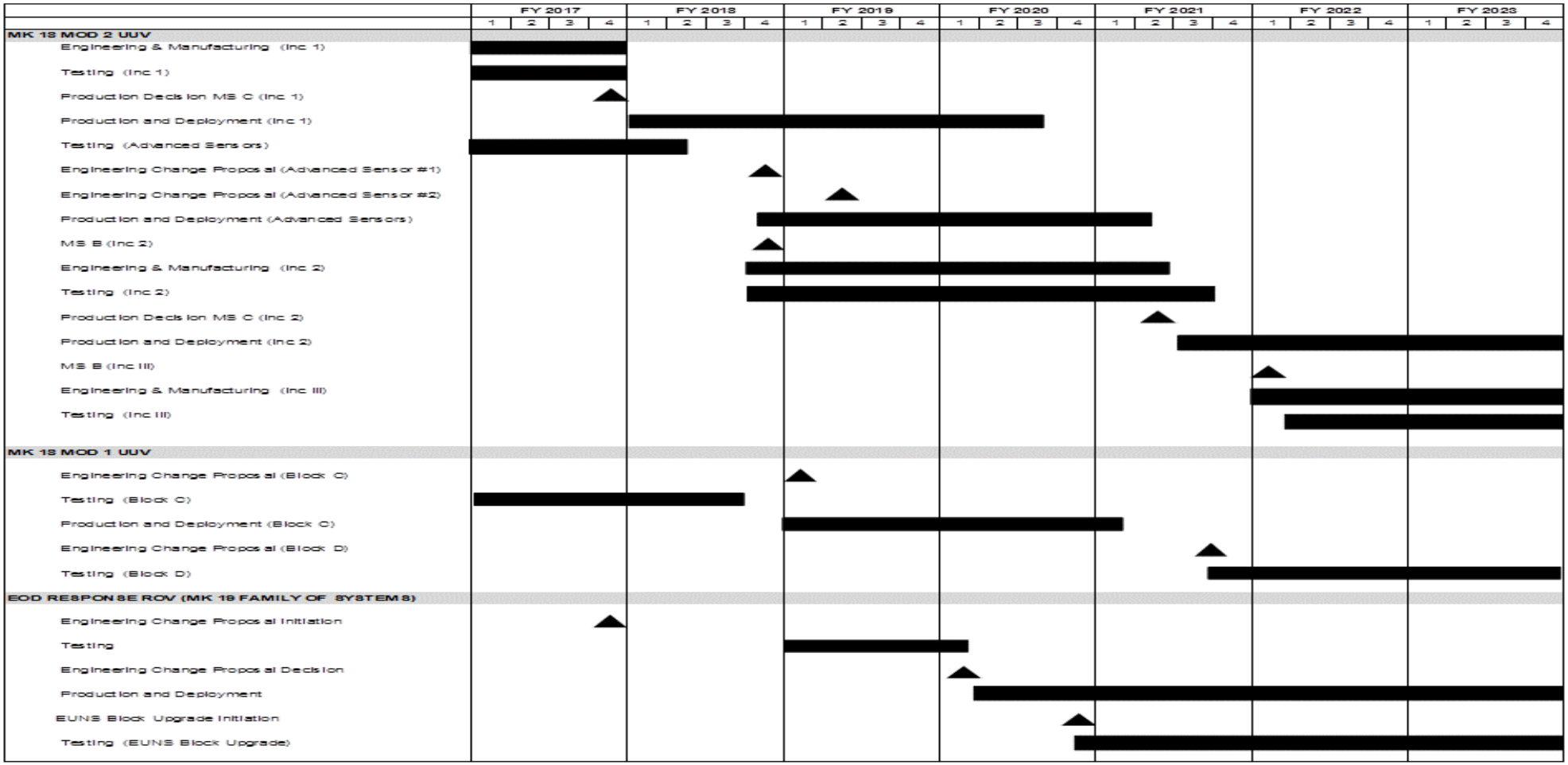
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management Support | WR | EODTECHDIV : IH, MD | 4.052 | 0.433 | Oct 2016 | 0.511 | Nov 2017 | 0.520 | Nov 2018 | - | | 0.520 | Continuing | Continuing | Continuing |
| Miscellaneous | WR | NSWC Activities : Not Specified | 2.303 | 0.000 | Oct 2016 | 0.252 | Nov 2017 | 0.158 | Nov 2018 | - | | 0.158 | Continuing | Continuing | Continuing |
| DAWDF | Various | Not Specified : Not Specified | 0.018 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.018 | - |
| | | **Subtotal** | 6.373 | 0.433 | | 0.763 | | 0.678 | | - | | 0.678 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 109.817 | 15.485 | | 19.118 | | 16.936 | | - | | 16.936 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603654N / *JT Service Explosive Ordn Dev* | **Project (Number/Name)**<br>4023 / *VSW MCM/Force Protection UUV* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603654N / *JT Service Explosive Ordn Dev* | **Project (Number/Name)**<br>4023 / *VSW MCM/Force Protection UUV* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 4023*** | | | | |
| TITLE: MK 18 MOD 2 UUV | 1 | 2017 | 4 | 2023 |
| ---Engineering & Manufacturing (Inc 1) | 1 | 2017 | 4 | 2017 |
| ---Testing (Inc 1) | 1 | 2017 | 4 | 2017 |
| ---Production Decision MS C (Inc 1) | 4 | 2017 | 4 | 2017 |
| ---Production and Deployment (Inc 1) | 1 | 2018 | 3 | 2020 |
| ---Testing (Advance Sensors) | 1 | 2017 | 2 | 2018 |
| ---Engineering Change Proposal (Advanced Sensors #1) | 4 | 2018 | 4 | 2018 |
| ---Engineering Change Proposal (Advanced Sensors #2) | 2 | 2019 | 2 | 2019 |
| ---Production and Deployment (Advanced Sensors) | 4 | 2018 | 1 | 2021 |
| ---MS B (Inc 2) | 4 | 2018 | 4 | 2018 |
| ---Engineering & Manufacturing (Inc 2) | 4 | 2018 | 2 | 2021 |
| ---Testing (Inc 2) | 4 | 2018 | 3 | 2021 |
| ---Production Decision MS C (Inc 2) | 2 | 2021 | 2 | 2021 |
| ---Production and Deployment (Inc 2) | 3 | 2021 | 4 | 2023 |
| ---MS B (Inc III) | 1 | 2022 | 1 | 2022 |
| ---Engineering & Manufacturing (Inc III) | 1 | 2022 | 4 | 2023 |
| ---Testing (Inc III) | 2 | 2022 | 4 | 2023 |
| TITLE: MK 18 MOD 1 UUV | 1 | 2017 | 4 | 2023 |
| ---Engineering Change Proposal (Block C) | 1 | 2019 | 1 | 2019 |
| ---Testing (Block C) | 1 | 2017 | 3 | 2018 |
| ---Production and Deployment (Block C) | 1 | 2019 | 1 | 2021 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603654N / *JT Service Explosive Ordn Dev* | **Project (Number/Name)**<br>4023 / *VSW MCM/Force Protection UUV* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ---Engineering Change Proposal (Block D) | 3 | 2021 | 3 | 2021 |
| ---Testing (Block D) | 4 | 2021 | 4 | 2023 |
| TITLE: EOD RESPONSE (ROV) (MK 19 FAMILY OF SYSTEMS) | 1 | 2017 | 4 | 2023 |
| ---Engineering Change Proposal Decision_ | 4 | 2017 | 4 | 2017 |
| ---Testing | 1 | 2019 | 1 | 2020 |
| ---Engineering Change Proposal Decision | 1 | 2020 | 1 | 2020 |
| ---Production and Deployment | 2 | 2020 | 4 | 2023 |
| ---EUNS Block Upgrade Initiation | 4 | 2020 | 4 | 2020 |
| ---Testing (EUNS Block Upgrade) | 4 | 2020 | 4 | 2023 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603713N *I Ocean Engineering Tech Dev* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 60.660 | 4.639 | 8.212 | 5.915 | - | 5.915 | 5.619 | 5.731 | 5.845 | 5.965 | Continuing | Continuing |
| 0099: *Deep Submergence Bio Med Dev* | 32.350 | 3.555 | 4.691 | 4.487 | - | 4.487 | 4.360 | 4.444 | 4.534 | 4.627 | Continuing | Continuing |
| 0394: *Shallow Depth Diving EQ* | 28.310 | 1.084 | 3.521 | 1.428 | - | 1.428 | 1.259 | 1.287 | 1.311 | 1.338 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

Developments in this program will enable the U.S. Navy to overcome deficiencies that constrain manned diving operations in several critical areas such as submarine rescue, recovery, salvage, underwater ship husbandry, underwater construction and naval special operations. This program develops biomedical technology, diver life support equipment, and the systems, tools, and procedures to permit manned underwater operations and enhance diver performance and safety.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 4.556 | 8.212 | 6.021 | - | 6.021 |
| Current President's Budget | 4.639 | 8.212 | 5.915 | - | 5.915 |
| Total Adjustments | 0.083 | 0.000 | -0.106 | - | -0.106 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | 0.151 | 0.000 | | | |
| • SBIR/STTR Transfer | -0.068 | 0.000 | | | |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -0.106 | - | -0.106 |

**Change Summary Explanation**

Decrease from FY18 to FY19 is in accordance with planned program profile and is not due to a negative action against this effort.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603713N / *Ocean Engineering Tech Dev* | Project (Number/Name)<br>0099 / *Deep Submergence Bio Med Dev* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0099: *Deep Submergence Bio Med Dev* | 32.350 | 3.555 | 4.691 | 4.487 | - | 4.487 | 4.360 | 4.444 | 4.534 | 4.627 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

This project:
1) Develops advanced biomedical and bioengineering technology for medical and life support enhancement to decrease submariner deaths and permanent injury in a disabled submarine (DISSUB) and during submarine escape and rescue;
2) Conducts research for diver health, safety, and effectiveness:
- to increase understanding of human performance and enhanced diver stress management and survivability in high stress environments such as in cold/warm water and at altitude; and - to validate and improve the accuracy of assumptions associated with equipment testing and certification, diving procedures, and diver biomedical physiology.

Deliverables for DISSUB include: medical guidance/procedures increasing submariner survivability for submarine escape and rescue (including new Submarine Rescue Diving and Recompression System (SRDRS)), life support parameters, medical procedures for life support; exposure and mitigation guidance for atmospheric contaminants, high levels of oxygen and/or carbon dioxide; prevention and treatment of decompression sickness and pulmonary oxygen toxicity; and senior survivor expert decision system.

Deliverables for diver health and safety include: decompression guidance in extreme environment diving with various breathing mixtures, temperatures, durations, and altitudes; exposure guidance for oxygen breathing; diver performance guidance based on physiological effects of diving; enhanced underwater swimming efficiency; enhanced diver thermal protection; collection of operational diving depth/time profiles to predict decompression risk, and exposure and mitigation guidance for divers experiencing underwater continuous noise, impulse noise, or underwater blast.

Requirements:
OPNAVINST 3150.27C, Navy Diving Policy and Joint Military Diving Technology and Training Program, 24 Jun 2016
Navy Salvage and Navy Diving Capabilities-Based Assessment (CBA) Report, 19 Dec 2013
NAPDD #587-873, Deep Submergence Biomedical Development, 23 Nov 1999
NAVSEA Instruction 3900.10, Management of the Deep Submergence Biomedical Research and Development Program, 4 Feb 2003

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Deep Submergence Bio Med Dev - Diver Health and Safety | 2.029 | 2.396 | 2.244 | 0.000 | 2.244 |
| ***Articles:*** | - | - | - | - | - |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0099 / *Deep Submergence Bio Med Dev* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Description:*** Diver Health and Safety Research: Novel methods for decompression safety and treatment of decompression sickness/arterial gas embolism. Advanced decompression models for extreme environments, including thermally challenging, long duration, multi-gas, and/or diving at altitude. Diving physiology advances in exercise, thermal exposure, oxygen/carbon dioxide alterations, other gas mixture alterations, hydration, and sustained operations. Develop pulmonary oxygen toxicity exposure limits. Provide pulmonary and oxygen toxicity mitigation strategies. Develop an advanced diver thermal model. Develop advanced insulation garments for diver thermal protection. Develop guidance for optimizing thermal control during decompression. Develop guidelines for conduct of diving operations at altitude. Develop guidance for infra- and ultra-sound diver exposure. Continue collection of operational and research dive data for inclusion in advanced probabilistic decompression models. Investigate diver in-water maladies. Develop/improve real-time decompression guidance and dive planning. Research procedures for assessing and mitigating risk for diving in contaminated water.<br><br>***FY 2018 Plans:***<br>Perform numerous mixed-gas, manned diving experiments to update surface-supplied helium-oxygen deep diving decompression tables which put divers at high risk for decompression sickness and felt to be too unsafe to use. Develop decompression guidance/procedures for diving at altitude using special diving apparatus. These manned diving experiments, required to evaluate decompression protocols, are labor intensive, requiring long days to provide adequate time for test subjects to decompress under constant supervision of diving watch-standers, investigators, medical personnel and other support staff and consequently more expensive than smaller scale and unmanned studies. The studies also require significant amounts of helium to produce the various helium-oxygen gas mixtures needed for divers breathing gas and the cost of helium continues to rise at double-digit annual rates. Continue development of vital decompression, thermal, physiological, breathing resistance and oxygen tolerance/toxicity recommendations including contributions by reengaged university partners. Reengaging these university partners in FY-18 is essential to sustaining the very small research base needed to support Navy diver occupational health and safety. The university and Navy laboratories (Navy Experimental Diving Unit, Panama City, FL; Naval Submarine Medical Research Laboratory, Groton, CT; Naval Medical Research Center, Bethesda, MD) will continue underwater physiological investigation to mitigate the risks of diving in the expanding Fleet mission areas of salvage, underwater ship husbandry, explosive ordnance disposal, underwater construction and special warfare. Future efforts will depend in part on the outcomes of studies currently in progress. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0099 / *Deep Submergence Bio Med Dev* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Additional work planned for FY18 resulting from the recent Technical Advisory Board proposal review process includes:<br>A software planning tool will be created to provide exposure guidance for divers who may be exposed to continuous, intermittent, or impulse noise while underwater. Decompression during diving at altitude will be man-tested to update current guidance. An updated decompression algorithm will be designed for the Navy Dive Computer for Helium-Oxygen diving with a rebreather. A ketogenic diet will be evaluated for its ability to reduce central nervous system oxygen toxicity (e.g., seizures) in working divers. An underwater pulse oximeter will be designed and tested for its ability to provide timely warning to a diver of impending hypoxia. Investigations into basic physiology for repeated, long hyperoxic dives while exercising will also take place.<br>***FY 2019 Base Plans:***<br>FY19 Base plans involve continued support for development of probabilistic models of Central Nervous System and Pulmonary Oxygen Toxicity in our ongoing efforts to expand the range of safe diving depths for divers using rebreathers. This work will also have relevance for disabled submarine response planning. Optimizing performance of dive teams operating at high altitude will continue to be an area of focus. Work will continue investigating the effects of hyperoxia during repeated, exertional, long-duration dives, with the objective of providing guidance to operational divers on mitigating the performance-impairing effects of whole body oxygen toxicity. Development of a software planning tool for divers at risk of exposure to underwater noise hazards will proceed as will work developing expanded altitude decompression tables. Investigation into the utility of a water-proofed pulse oximeter to reduce the risk of hypoxia for rebreather divers will be ongoing and efforts to determine whether a ketogenic diet can reduce the risk of seizures in divers breathing high partial pressures of oxygen will continue. We will also be soliciting research proposals to advance the work described in this section and continue underwater physiological investigation to mitigate the risks of diving in the expanding Fleet mission areas of salvage, underwater ship husbandry, explosive ordnance disposal, underwater construction and special warfare. Future efforts will depend in part on the outcomes of studies currently in progress. Continuing our partnership with Navy and University laboratories will be critical to our success as will cultivating new relationships with industry and academia.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0099 / *Deep Submergence Bio Med Dev* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Decrease from FY18 to FY19 is due to process improvements and inflationary changes requiring a decrease of $152 thousand resulting in the funding of one additional research project. | | | | | |
| ***Title:*** Deep Submergence Bio Med Dev - Submarine Rescue | 1.526 | 2.295 | 2.243 | 0.000 | 2.243 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Submarine Rescue/Escape Research: Provide decompression procedures for pressurized SRDRS operators. Investigate adjunctive therapies for treating DISSUB survivors. Provide updated guidance for food, water, clothing, medical supplies to enhance survival of submarine crews awaiting rescue. Develop/provide flexible computer-generated decompression schedules for wide range of conditions in a DISSUB. Develop DISSUB medical triage procedures and support DISSUB survival trials. Develop mitigation strategies to reduce hyperoxic exposures in closed vehicles/compartments. Develop treatment guidance for decompression sickness and arterial gas embolism in submarine escape and rescue. Investigate the use of novel pharmacologic agents to reduce decompression risk and/or oxygen toxicity in submarine rescuees. Develop/deploy toxic gas analyzer for use in pressurized DISSUB rescue. Investigate interventions for toxicological problems in DISSUB survivors. Develop strategies to minimize decompression sickness and arterial gas embolism with Submarine Escape and Immersion Suit (SEIS) training. | | | | | |
| ***FY 2018 Plans:***<br>Work will continue on development of mitigation strategies for pulmonary oxygen toxicity for rescued submariners, finalizing design of toxic gas analyzers for URC, determining whether an anti-inflammatory medication (Doxycycline) can mitigate the risk of DCS for decompressing submarine rescuees, and sheep studies involving shallow saturation scenarios evaluating oxygen prebreathing to increase surface interval times before onset of DCS. Multiple experimental manned air saturation dives will be performed to develop protocols that can be used to decrease submariner deaths during submarine escape and rescue from a pressurized disabled submarine too shallow for safe attachment of the Navy's submarine rescue vehicle. These saturation diving experiments, required to evaluate decompression protocols, are labor intensive, requiring 24/7 support and consequently more expensive than smaller scale studies. Current submarine rescue deep decompression schedules are theoretical due to ethical concerns about safe manned testing. These schedules will be tested with swine to determine the morbidity/mortality and provide recommendations as to whether the schedules require change. Stressors in a DISSUB will be studied to determine the effect on Senior Survivor cognition and decision making at critical times. Additionally, the disabled submarine and disabled rescue vehicle may result in hyperthermia and dehydration for survivors. Dehydration can worsen hyperthermia. The combination | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0099 / *Deep Submergence Bio Med Dev* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| of hyperthermia and dehydration will be tested to determine if current human thermoregulation models are adequate and/or accurate.<br><br>***FY 2019 Base Plans:***<br>FY19 Base plans involve continued support for studies to develop decompression protocols with or without oxygen pre-breathing for use with the Submarine Decompression System (SDS) as well as development of oxygen toxicity probabilistic models (CNS initially, then Pulmonary). Animal work will continue using sheep to develop protocols that will reduce the risk of DCS for submariners rescued without the availability of Transfer Under Pressure capability. Analysis of the impact DISSUB stressors have on submariner cognition and decision-making will continue, leading to recommendations for changes to the Guard Book depending on the results. Finally, investigation of the relationship between hyperthermia and dehydration will proceed, seeking to improve our thermal stress models to allow predictions of environmental conditions and recommendations regarding mitigations. We will also be soliciting research proposals to advance the work described in this section and continue to pursue answers to questions related to the unique physiological stressors associated with the DISSUB environment.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Decrease from FY18 to FY19 is in accordance with planned program profile and is not due to a negative action against this effort. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 3.555 | 4.691 | 4.487 | 0.000 | 4.487 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • OPN/0955: *Deep Subm Sys Proj (DSSP) Equip* | 0.806 | 4.178 | 3.629 | - | 3.629 | 2.909 | 2.971 | 3.029 | 3.091 | Continuing | Continuing |

**Remarks**

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0099 / *Deep Submergence Bio Med Dev* |

**D. Acquisition Strategy**

Integrated thrust area teams (e.g., decompression research) are established with university, commercial, and in-house Navy labs to jointly execute biomedical R&D. Peer review of research proposals accomplished by independent Technical Advisory Board. Annual review of progress by Executive Review Board (CNO/NAVSEA/ ONR/BUMED). Program management by 0-6 Undersea Medical Officer. Contracting by competitive process using BAA and leveraging ONR capabilities.

**E. Performance Metrics**

Quarterly Program Reviews of researcher progress measured against research proposal goals and timelines.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0099 / *Deep Submergence Bio Med Dev* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diving Equipment Product Development | C/CPAF | Phoenix International : Largo, MD | 0.738 | 0.133 | Aug 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.871 | - |
| | | **Subtotal** | 0.738 | 0.133 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.871 | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Development Test & Evaluation | WR | NEDU : Panama City, FL | 21.248 | 1.745 | Nov 2016 | 1.270 | Nov 2017 | 0.671 | Nov 2018 | - | | 0.671 | Continuing | Continuing | Continuing |
| Development Test & Evaluation | WR | NMRC : Silver Spring, MD | 8.061 | 0.349 | Nov 2016 | 1.069 | Nov 2017 | 0.484 | Nov 2018 | - | | 0.484 | Continuing | Continuing | Continuing |
| Development Test & Evaluation | Various | DUKE UNIV : Durham, NC | 0.940 | 0.181 | Jul 2017 | 1.115 | Jul 2018 | 1.060 | Jul 2019 | - | | 1.060 | Continuing | Continuing | Continuing |
| Development Test & Evaluation | C/CPFF | ROH : Arlington, VA | 0.077 | 0.205 | May 2017 | 0.030 | May 2018 | 0.030 | May 2019 | - | | 0.030 | Continuing | Continuing | Continuing |
| Development Test & Evaluation | Various | Various : Various | 0.000 | 0.000 | | 0.236 | Mar 2018 | 1.261 | Mar 2019 | - | | 1.261 | Continuing | Continuing | Continuing |
| Development Test & Evaluation | C/FFP | WISCONSIN : Madison, WI | 0.523 | 0.464 | Feb 2017 | 0.349 | Feb 2018 | 0.335 | Feb 2019 | - | | 0.335 | Continuing | Continuing | Continuing |
| Development Test & Evaluation | C/FFP | SUNY : Buffalo, NY | 0.272 | 0.414 | Apr 2017 | 0.592 | Apr 2018 | 0.614 | Apr 2019 | - | | 0.614 | Continuing | Continuing | Continuing |
| Development Test & Evaluation | WR | NSWC : Panama City, FL | 0.000 | 0.039 | Jun 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.039 | - |
| | | **Subtotal** | 31.121 | 3.397 | | 4.661 | | 4.455 | | - | | 4.455 | Continuing | Continuing | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603713N / *Ocean Engineering Tech Dev* | Project (Number/Name)<br>0099 / *Deep Submergence Bio Med Dev* | |

**Management Services ($ in Millions)**

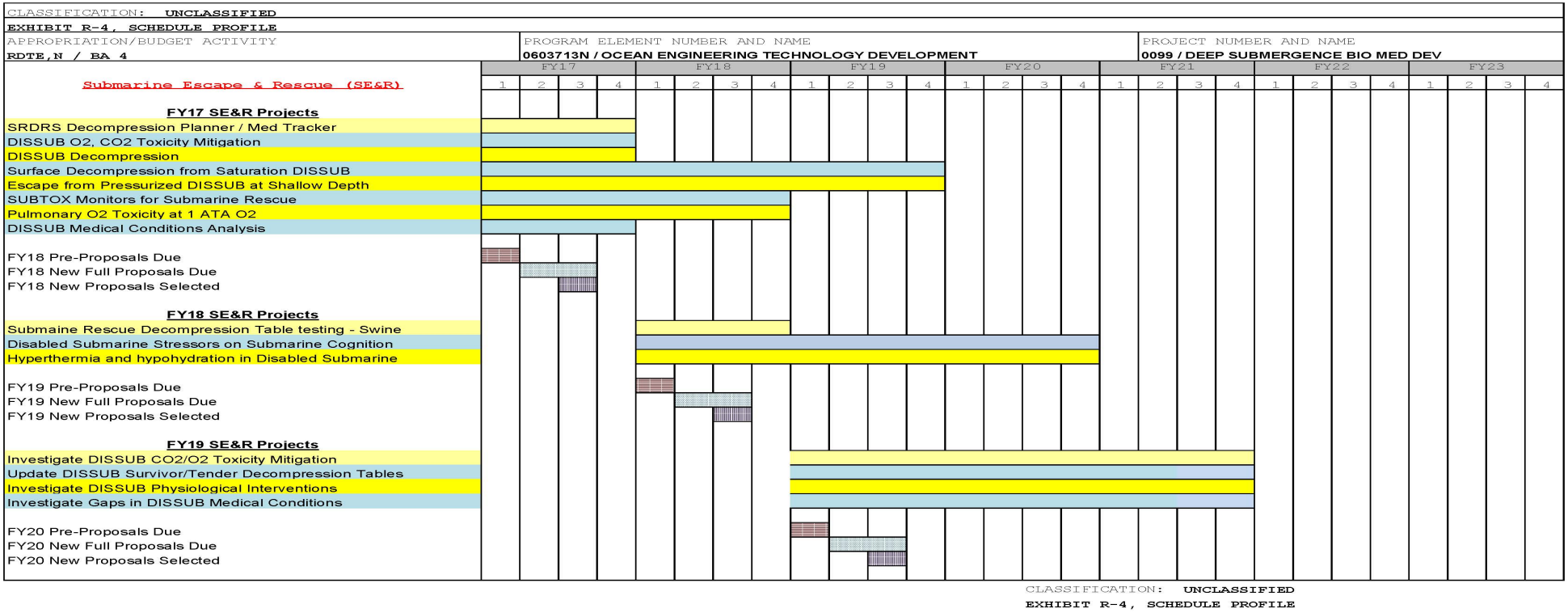
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Travel | Various | Various : Various | 0.491 | 0.025 | Oct 2016 | 0.030 | Oct 2017 | 0.032 | Oct 2018 | - | | 0.032 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.491 | 0.025 | | 0.030 | | 0.032 | | - | | 0.032 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 32.350 | 3.555 | | 4.691 | | 4.487 | | - | | 4.487 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0099 / *Deep Submergence Bio Med Dev* |

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0099 / *Deep Submergence Bio Med Dev* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0099 / *Deep Submergence Bio Med Dev* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 0099*** | | | | |
| Diver Health & Safety (DH&S): FY17 DH&S Projects: Diving Physiology: Thermal, Respiratory Loads | 1 | 2017 | 4 | 2018 |
| Diver Health & Safety (DH&S): FY17 DH&S Projects: CNS / Pulmonary O2 Toxicity Mitigration | 1 | 2017 | 4 | 2019 |
| Diver Health & Safety (DH&S): FY17 DH&S Projects: Advances in Decompression Modeling | 1 | 2017 | 4 | 2019 |
| Diver Health & Safety (DH&S): FY17 DH&S Projects: Doxycycline Adjunct to Prevent Decompression Sickness | 1 | 2017 | 4 | 2018 |
| Diver Health & Safety (DH&S): FY17 DH&S Projects: Diving at Altitude | 1 | 2017 | 4 | 2019 |
| Diver Health & Safety (DH&S): FY18 Pre-Proposals Due | 1 | 2017 | 1 | 2017 |
| Diver Health & Safety (DH&S): FY18 New Full Proposals Due | 2 | 2017 | 3 | 2017 |
| Diver Health & Safety (DH&S): FY18 New Proposals Selected | 3 | 2017 | 3 | 2017 |
| Diver Health & Safety (DH&S): FY18 DH&S Projects: Repeated hyperoxic exercising dives | 1 | 2018 | 4 | 2019 |
| Diver Health & Safety (DH&S): FY18 DH&S Projects: Underwater sound exposure Risk Estimator | 1 | 2018 | 4 | 2019 |
| Diver Health & Safety (DH&S): FY18 DH&S Projects: Altitude Decompression Tables | 1 | 2018 | 4 | 2020 |
| Diver Health & Safety (DH&S): FY18 DH&S Projects: Underwater Pulse Oximetry to Prevent Hypoxia in Divers | 1 | 2018 | 4 | 2019 |
| Diver Health & Safety (DH&S): FY18 DH&S Projects: Ketogenic Diet to Reduce O2 Toxicity Effects | 1 | 2018 | 4 | 2020 |
| Diver Health & Safety (DH&S): FY18 DH&S Projects: Navy Dive Computer Algorithm for Deep Helium-O2 diving | 1 | 2018 | 4 | 2018 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0099 / *Deep Submergence Bio Med Dev* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Diver Health & Safety (DH&S): FY19 Pre-Proposals Due | 1 | 2018 | 1 | 2018 |
| Diver Health & Safety (DH&S): FY19 New Full Proposals Due | 2 | 2018 | 3 | 2018 |
| Diver Health & Safety (DH&S): FY19 New Proposals Selected | 3 | 2018 | 3 | 2018 |
| Diver Health & Safety (DH&S): FY19 DH&S Projects: Rebreather Diving at Altitudes to 12,000 Feet | 1 | 2019 | 4 | 2021 |
| Diver Health & Safety (DH&S): FY19 DH&S Projects: Adjuncts to Prevent Decompression Sickness | 1 | 2019 | 4 | 2021 |
| Diver Health & Safety (DH&S): FY19 DH&S Projects: Update Underwater Sound Exposure Guidance | 1 | 2019 | 4 | 2021 |
| Diver Health & Safety (DH&S): FY19 DH&S Projects: Extend Helium-O2 Deep Diving Decompression Tables | 1 | 2019 | 4 | 2021 |
| Diver Health & Safety (DH&S): FY19 DH&S Projects: Diving/Hyperbaric Physiological Enhancement/Monitoring | 1 | 2019 | 4 | 2021 |
| Diver Health & Safety (DH&S): FY19 DH&S Projects: Update thermoregulation Guidance | 1 | 2019 | 4 | 2021 |
| Diver Health & Safety (DH&S): FY20 Pre-Proposals Due | 1 | 2019 | 1 | 2019 |
| Diver Health & Safety (DH&S): FY20 New Full Proposals Due | 2 | 2019 | 3 | 2019 |
| Diver Health & Safety (DH&S): FY20 New Proposals Selected | 3 | 2019 | 3 | 2019 |
| Submarine Escape & Rescue (SE&R): FY17 SE&R Projects: SRDRS Decompression Planner / Med Tracker | 1 | 2017 | 4 | 2017 |
| Submarine Escape & Rescue (SE&R): FY17 SE&R Projects: DISSUB O2, CO2 Toxicity Mitigation | 1 | 2017 | 4 | 2017 |
| Submarine Escape & Rescue (SE&R): FY17 SE&R Projects: DISSUB Decompression | 1 | 2017 | 4 | 2017 |
| Submarine Escape & Rescue (SE&R): FY17 SE&R Projects: Surface Decompression from Saturation DISSUB | 1 | 2017 | 4 | 2019 |
| Submarine Escape & Rescue (SE&R): FY17 SE&R Projects: Escape from Pressurized DISSUB at Shallow Depth | 1 | 2017 | 4 | 2019 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0099 / *Deep Submergence Bio Med Dev* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Submarine Escape & Rescue (SE&R): FY17 SE&R Projects: SUBTOX Monitors for Submarine Rescue | 1 | 2017 | 4 | 2018 |
| Submarine Escape & Rescue (SE&R): FY17 SE&R Projects: Pulmonary O2 Toxicity at 1 ATA O2 | 1 | 2017 | 4 | 2018 |
| Submarine Escape & Rescue (SE&R): FY17 SE&R Projects: DISSUB Medical Conditions Analysis | 1 | 2017 | 4 | 2017 |
| Submarine Escape & Rescue (SE&R): FY18 Pre-Proposals Due | 1 | 2017 | 1 | 2017 |
| Submarine Escape & Rescue (SE&R): FY18 New Full Proposals Due | 2 | 2017 | 3 | 2017 |
| Submarine Escape & Rescue (SE&R): FY18 New Proposals Selected | 3 | 2017 | 3 | 2017 |
| Submarine Escape & Rescue (SE&R): FY18 SE&R Projects: Submarine Rescue Decompression Table testing - Swine | 1 | 2018 | 4 | 2018 |
| Submarine Escape & Rescue (SE&R): FY18 SE&R Projects: Disabled Submarine Stressors on Submarine Cognition | 1 | 2018 | 4 | 2020 |
| Submarine Escape & Rescue (SE&R): FY18 SE&R Projects: Hyperthermia and hypohydration in Disabled Submarine | 1 | 2018 | 4 | 2020 |
| Submarine Escape & Rescue (SE&R): FY19 Pre-Proposals Due | 1 | 2018 | 1 | 2018 |
| Submarine Escape & Rescue (SE&R): FY19 New Full Proposals Due | 2 | 2018 | 3 | 2018 |
| Submarine Escape & Rescue (SE&R): FY19 New Proposals Selected | 3 | 2018 | 3 | 2018 |
| Submarine Escape & Rescue (SE&R): 'FY19 SE&R Projects: Investigate DISSUB CO2/O2 Toxicity Mitigation | 1 | 2019 | 4 | 2021 |
| Submarine Escape & Rescue (SE&R): 'FY19 SE&R Projects: Update DISSUB Survivor/Tender Decompression Tables | 1 | 2019 | 4 | 2021 |
| Submarine Escape & Rescue (SE&R): 'FY19 SE&R Projects: Investigate DISSUB Physiological Interventions | 1 | 2019 | 4 | 2021 |
| Submarine Escape & Rescue (SE&R): 'FY19 SE&R Projects: Investigate Gaps in DISSUB Medical Conditions | 1 | 2019 | 4 | 2021 |
| Submarine Escape & Rescue (SE&R): FY20 Pre-Proposals Due | 1 | 2019 | 1 | 2019 |
| Submarine Escape & Rescue (SE&R): FY20 New Full Proposals Due | 2 | 2019 | 3 | 2019 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0099 / *Deep Submergence Bio Med Dev* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Submarine Escape & Rescue (SE&R): FY20 New Proposals Selected | 3 | 2019 | 3 | 2019 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603713N / *Ocean Engineering Tech Dev* | Project (Number/Name)<br>0394 / *Shallow Depth Diving EQ* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0394: *Shallow Depth Diving EQ* | 28.310 | 1.084 | 3.521 | 1.428 | - | 1.428 | 1.259 | 1.287 | 1.311 | 1.338 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

This project develops systems to support submarine escape and rescue missions, and conventional diver operations. Diver operations include ship husbandry, salvage/ recovery, and submarine rescue operations to support national, as well as Navy, needs around the world. Modern certifiable diving systems that ensure diver safety and allow maximum work efficiency will replace currently antiquated systems. R&D will be performed in the areas of diver efficiency, visual enhancement, contaminated water diving, diver thermal protection, and recompression chamber technology.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Shallow Depth Diving EQ - Diving | 0.933 | 1.747 | 1.379 | 0.000 | 1.379 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Continued research on contaminated water diving and research on diver thermal protection, C02 monitors and diver sound protection. | | | | | |
| ***FY 2018 Plans:***<br>Work will be completed on the HUD portion of the Divers Augmented Visual Display (DAVD) and manned testing of the new equipment will be conducted. This will complete one of three parts of this system. Continue work on a 3D sonar and diver tracking system that is intended to integrate with the DAVD system. This will create a virtual model of the underwater environment that will be linked to real-time location of the diver thus allowing extensive visual range and target location even in no-visability waters. A flexible, double lock recompression chamber system contract (3-year) will be initiated that will provide a lightweight and small volume alternative to the existing Transportable Recompression Chamber System (TRCS). Testing will begin on a new SCUBA regulator to replace our inventory of older regulators that were designed in the 1960s. | | | | | |
| ***FY 2019 Base Plans:***<br>Begin work on a high resolution, high frequency, short range visualization system (HI RES SONAR) that will integrate with the Divers Augmented Visual Display (DAVD) system. This will allow accurate, real time visualization for use when conducting underwater search, salvage, ship husbandry, or construction in low visibility water. Testing on the modernized SCUBA regulator will be completed for all COTS versions selected for testing. Work will continue on the design and testing of a flexible double lock recompression chamber. | | | | | |
| ***FY 2019 OCO Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0394 / *Shallow Depth Diving EQ* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Decrease of $0.368 million is accounted for by a reduced 2nd year cost for the PCCI FLEX Chamber project and a reduction in the number and cost of DAVD projects in FY19. | | | | | |
| ***Title:*** Shallow Depth Diving EQ - Submarine Rescue | 0.151 | 1.774 | 0.049 | 0.000 | 0.049 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Submarine rescue decompression system permits decompression of submarine crew rescued from a pressurized, disabled submarine of pressures up to 6 atmospheres (ATA).<br>***FY 2018 Plans:***<br>Will complete manned testing, sea trials, certification and IOC for SRDRS TUP.<br>***FY 2019 Base Plans:***<br>Engineering analysis of pressurized rescue skirt.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Decrease of $1.725M from FY18 to FY19 is due to scheduled certification and delivery of the Transfer Under Pressure (TUP) capability to the Navy during FY18. Decrease from FY18 to FY19 is in accordance with planned program profile and is not due to a negative action against this effort. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 1.084 | 3.521 | 1.428 | 0.000 | 1.428 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • OPN/0955: *Deep Subm Sys Proj (DSSP) Equip* | 0.806 | 4.178 | 3.629 | - | 3.629 | 2.909 | 2.971 | 3.029 | 3.091 | Continuing | Continuing |
| • OPN/1130: *Diving and Salvage Equipment* | 8.176 | 10.619 | 10.706 | - | 10.706 | 11.940 | 10.814 | 10.881 | 11.078 | 0.000 | 121.031 |

**Remarks**

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0394 / *Shallow Depth Diving EQ* |

**D. Acquisition Strategy**

Diving Program acquisitions are executed and managed by SEA00C. Acquisitions are made for both COTS and developmental items as required to ensure adequate operational availability and safety of the diver. R&D projects are selected in March for a November award using a Broad Area Announcement.
Submarine Rescue Systems - prime integration contract is in place and final efforts in pursuit of certification are underway.

**E. Performance Metrics**

Diving - Semi-annual program review with NEDU.
Diving - Annual program review for each R&D project.
Diving & Submarine Rescue - Quarterly execution assessments.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0394 / *Shallow Depth Diving EQ* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Systems Engineering - Design, Integration (PMS-391 TUP) | C/CPAF | Oceaneering : Hanover, MD | 24.258 | 0.151 | Oct 2017 | 1.774 | Oct 2017 | 0.049 | Jan 2019 | - | | 0.049 | 0.000 | 26.232 | - |
| Diving Equipment Product Development (00C) | Various | Various : Various | 2.622 | 0.000 | | 0.000 | | 0.337 | Oct 2018 | - | | 0.337 | Continuing | Continuing | Continuing |
| Diving Equipment Product Development (00C) | C/CPFF | PCCI : Alexandria, VA | 0.329 | 0.000 | | 0.887 | Mar 2018 | 0.680 | Jan 2019 | - | | 0.680 | 0.000 | 1.896 | - |
| Diving Equipment Product Development (00C) | C/CPFF | Penn state UARC : Not Specified | 0.000 | 0.400 | Jan 2017 | 0.200 | Jan 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Diving Equipment Product Development (00C) | WR | NSWC-PC : Panama City, FL | 0.453 | 0.130 | Mar 2017 | 0.464 | Nov 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 27.662 | 0.681 | | 3.325 | | 1.066 | | - | | 1.066 | Continuing | Continuing | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Developmental Test and Evaluation (00C) | WR | NEDU : Panama City, FL | 0.048 | 0.403 | Nov 2016 | 0.075 | Mar 2018 | 0.250 | Jan 2019 | - | | 0.250 | 0.000 | 0.776 | - |
| | | **Subtotal** | 0.048 | 0.403 | | 0.075 | | 0.250 | | - | | 0.250 | 0.000 | 0.776 | N/A |

**Management Services ($ in Millions)**

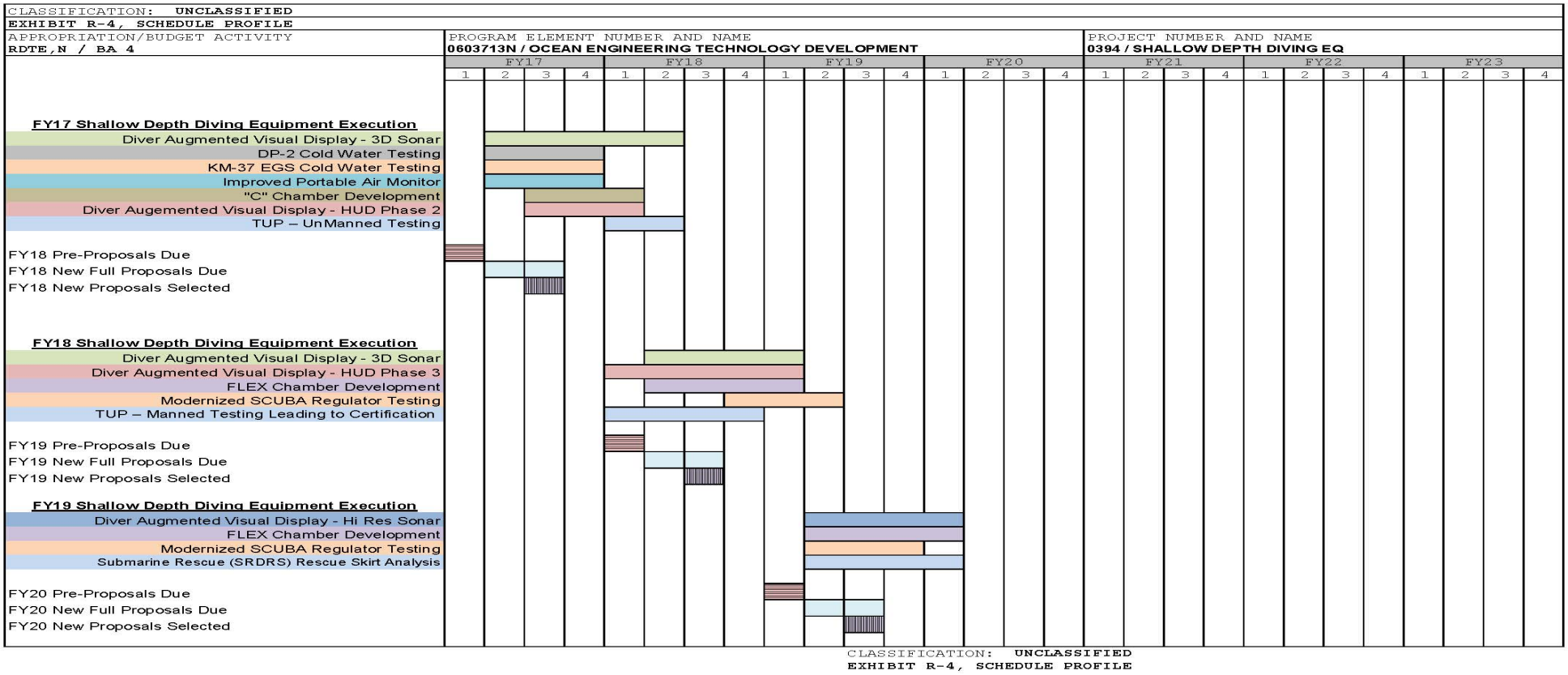
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Travel (00C) | Various | NAVSEA : Washington, DC | 0.140 | 0.000 | | 0.020 | Oct 2017 | 0.022 | Oct 2018 | - | | 0.022 | Continuing | Continuing | Continuing |
| SBIR Assessment | Various | Various : Various | 0.443 | 0.000 | | 0.074 | Oct 2017 | 0.062 | Oct 2018 | - | | 0.062 | 0.000 | 0.579 | - |
| Program Management Support (00C) | C/CPFF | Unknown : Not Specified | 0.017 | 0.000 | | 0.027 | Mar 2018 | 0.028 | Mar 2019 | - | | 0.028 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.600 | 0.000 | | 0.121 | | 0.112 | | - | | 0.112 | Continuing | Continuing | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603713N / *Ocean Engineering Tech Dev* | Project (Number/Name)<br>0394 / *Shallow Depth Diving EQ* | |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 28.310 | 1.084 | | 3.521 | | 1.428 | | - | | 1.428 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0394 / *Shallow Depth Diving EQ* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0394 / *Shallow Depth Diving EQ* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 0394*** | | | | |
| FY17 Diving Equipment Execution: Diver Augmented Visual Display - 3D Sonar | 2 | 2017 | 2 | 2018 |
| FY17 Diving Equipment Execution: DP-2 Cold Water Testing | 2 | 2017 | 4 | 2017 |
| FY17 Diving Equipment Execution: KM-37 EGS Cold Water Testing | 2 | 2017 | 4 | 2017 |
| FY17 Diving Equipment Execution: Improved Portable Air Monitor | 2 | 2017 | 4 | 2017 |
| FY17 Diving Equipment Execution: "C" Chamber Development | 3 | 2017 | 1 | 2018 |
| FY17 Diving Equipment Execution: Diver Augemented Visual Display - HUD Phase 2 | 3 | 2017 | 1 | 2018 |
| FY17 Diving Equipment Execution: TUP - UnManned Testing | 1 | 2018 | 2 | 2018 |
| FY18 Pre-Proposals Due | 1 | 2017 | 1 | 2017 |
| FY18 New Full Proposals Due | 2 | 2017 | 3 | 2017 |
| FY18 New Proposals Selected | 3 | 2017 | 3 | 2017 |
| FY18 Diving Equipment Execution: Diver Augmented Visual Display - 3D Sonar | 2 | 2018 | 1 | 2019 |
| FY18 Diving Equipment Execution: Diver Augmented Visual Display - HUD Phase 3 | 1 | 2018 | 1 | 2019 |
| FY18 Diving Equipment Execution: FLEX Chamber Development | 2 | 2018 | 1 | 2019 |
| FY18 Diving Equipment Execution: Modernized SCUBA Regulator Testing | 4 | 2018 | 2 | 2019 |
| FY18 Diving Equipment Execution: TUP Manned Testing Leading to Certification | 1 | 2018 | 4 | 2018 |
| FY19 Pre-Proposals Due | 1 | 2018 | 1 | 2018 |
| FY19 New Full Proposals Due | 2 | 2018 | 3 | 2018 |
| FY19 New Proposals Selected | 3 | 2018 | 3 | 2018 |
| FY19 Diving Equipment Execution: FY19 Diver Augmented Visual Display - Hi Res Sonar | 2 | 2019 | 1 | 2020 |
| FY19 Diving Equipment Execution: FLEX Chamber Development | 2 | 2019 | 1 | 2020 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603713N / *Ocean Engineering Tech Dev* | **Project (Number/Name)**<br>0394 / *Shallow Depth Diving EQ* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| FY19 Diving Equipment Execution: Modernized SCUBA Regulator Testing | 2 | 2019 | 4 | 2019 |
| FY19 Diving Equipment Execution: Submarine Rescue (SRDRS) Rescue Skirt Analysis | 2 | 2019 | 1 | 2020 |
| FY20 Pre-Proposals Due | 1 | 2019 | 1 | 2019 |
| FY20 New Full Proposals Due | 2 | 2019 | 3 | 2019 |
| FY20 New Proposals Selected | 3 | 2019 | 3 | 2019 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603721N *I Environmental Protection* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 442.286 | 19.117 | 20.214 | 19.811 | - | 19.811 | 20.351 | 20.333 | 20.688 | 21.141 | Continuing | Continuing |
| 0401: *Shipboard Waste Mgmt* | 351.165 | 8.191 | 7.920 | 7.776 | - | 7.776 | 8.007 | 8.915 | 9.047 | 9.276 | Continuing | Continuing |
| 0817: *Environmental Sustainability Development (NESDI)* | 44.352 | 5.600 | 4.782 | 4.266 | - | 4.266 | 4.439 | 6.120 | 6.237 | 6.358 | Continuing | Continuing |
| 9204: *Marine Mammal Research* | 46.769 | 5.326 | 4.512 | 4.769 | - | 4.769 | 4.905 | 5.298 | 5.404 | 5.507 | Continuing | Continuing |
| 9205: *Marine Mammal Settlement* | 0.000 | 0.000 | 3.000 | 3.000 | - | 3.000 | 3.000 | 0.000 | 0.000 | 0.000 | 0.000 | 9.000 |

**A. Mission Description and Budget Item Justification**

This program develops and evaluates processes, hardware, systems, operational procedures, scientific methods, and environmental studies that will allow the Navy to operate in U.S., foreign, and international waters, air, space, and land areas while complying with environmental laws, regulations, Executive Orders, policies and international agreements.

Many environmental laws, regulations, and policies impose restrictions on Navy training and testing, vessels, aircraft, and facilities that interfere with operations and/or increase the cost of operations. The Navy must be able to conduct its national security mission in compliance with applicable environmental requirements in the U.S. and abroad without compromising performance, safety, or health, while simultaneously minimizing the cost of compliance. The projects for this Program Element (PE) support the Navy's compliance with the (a) Clean Water Act, (b) Act to Prevent Pollution from Ships, (c) International Convention for the Prevention of Pollution from Ships, (d) DoD Regulations on Vessels Owned or Operated by the Department of Defense, (e) OPNAV Environmental and Natural Resources Program Manual, (f) Uniform National Discharge Standards [UNDS] Phase I Standard, (EO) 13148, Greening the Government Through Leadership in Environmental Management, (g) Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990, (h) National Invasive Species Act of 1996, (i) Ballast Water Management for Control of Nonindigenous Species in Waters of the United States, (j) Clean Air Act, (k) Federal Insecticide, Fungicide, and Rodenticide Act, (l) Marine Mammal Protection Act, and (m) Endangered Species Act. References (a) through (m) establish Level I environmental protection requirements. Project 0401, Shipboard Waste Management, supports efforts that enable Navy ships and submarines to comply with laws, regulations, and policies in six major areas: (1) Liquid Wastes, (2) UNDS Rulemaking, (3) Hazardous Materials and Pollution Prevention, (4) Hull Antifouling Paints, (5) Technical Authority, and (6) Ballast Water Exchange Improvements. Project 0817, Environmental Sustainability Development, supports the development and validation of technologies to enable Navy facilities to comply with environmental laws, regulations, and policies in a cost-effective manner.

The Marine Mammal Research (MMR) program is responsible for applied research and works to address the Navy's key research needs and transition the results and technologies for use within the Navy's at-sea environmental compliance and permitting processes in compliance with the Marine Mammal Protection Act and the Endangered Species Act, with the goals of improving marine species impact analysis (including marine mammal take estimates), mitigation measures and monitoring capabilities. Key points of the MMR mission are: (1) Improve the best available science regarding the potential impacts to marine species from Navy activities, (2)

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603721N *I Environmental Protection* |

Expand the technology and methods available to the U.S. Navy marine species monitoring program (3) Preserve core Navy readiness capabilities. The This funding allows the Navy to avoid or reduce the chances of costly litigation for non-compliance.

$3.000M added in FY 2018 and FY2019 in accordance with settlement agreement under Marine Mammal Protection Act (new project created).

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 20.343 | 20.214 | 23.606 | - | 23.606 |
| Current President's Budget | 19.117 | 20.214 | 19.811 | - | 19.811 |
| Total Adjustments | -1.226 | 0.000 | -3.795 | - | -3.795 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -0.004 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | -2.988 | - | -2.988 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -0.807 | - | -0.807 |
| • Congressional Directed Reductions Adjustments | -1.222 | - | - | - | - |

**Change Summary Explanation**

The FY 2019 funding request was reduced by ($.104) million to reflect the Department of Navy's effort to support the Office of Management and Budget directed reforms for Efficiency and Effectiveness that include a lean, accountable, more efficient government.
Technical: FY19: TA reduced to support Ballast Water Management tasking related to procurement and testing of Navy approved Ballast Water Treatment System. Liquid Waste decrease due to completion of shipboard piping modifications for long-term assessment of sewage and graywater piping development, prevention, and cleaning. Non-copper Anti-fouling decrease reflects completion of in-situ testing of antifouling coatings.
Schedule: Not applicable.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603721N / *Environmental Protection* | Project (Number/Name)<br>0401 / *Shipboard Waste Mgmt* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0401: *Shipboard Waste Mgmt* | 351.165 | 8.191 | 7.920 | 7.776 | - | 7.776 | 8.007 | 8.915 | 9.047 | 9.276 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Navy ships and submarines must routinely operate in U.S., international, and foreign waters, and visit numerous U.S. and foreign ports. No body of water is without environmental restrictions that impact the movements and operations of Navy vessels. Environmental requirements tend to be most restrictive in port and in coastal waters, where the Navy's increasing littoral presence places ships and submarines in discharge-restricted waters for longer periods of time. Growing international cooperation in addressing global environmental concerns is resulting in expanding areas of ocean considered environmentally susceptible, where special prohibitions on ship discharges and operations are imposed. Navy vessels must comply with applicable environmental legal requirements while maintaining continued access to all waters for operations, exercises, training, and port access. The large crews and limited on-board space of Navy ships and submarines severely constrain their ability to hold wastes for return to port for shore side disposal.

Project 0401, Shipboard Waste Management, evaluates and develops shipboard environmental equipment, systems, technologies, processes, and practices to comply with environmental laws, regulations, Executive Orders, international agreements, foreign-country requirements, and DoD and Navy policies. The project focuses on providing engineering criteria, design guidance, and performance specifications for selecting, procuring, installing, integrating, and operating environmental equipment and systems on Navy ships and submarines, and on defining and developing processes, procedures and logistics support requirements. Environmental equipment, systems, processes and practices must meet legal and environmental requirements and be reliable, maintainable and achievable at sea, and impose no or low manning burden. Environmental equipment and systems must meet Navy-unique shipboard requirements (performance, space, weight, shock, vibration, electromagnetic compatibility, manning, automation, etc.), incorporate integrated logistics support, minimize life-cycle cost, and include validated acquisition, design, installation, and operating documentation. Shipboard processes and practices must be feasible and must be compatible with ship and submarine operational, maintenance, manning, habitability, health, and safety requirements. It also addresses afloat environmental issues other than shipboard wastes, e.g., access to environmental data for planning Fleet operations and exercises.

The Afloat Environmental Quality Program supports the designated Technical Warrant Holders for Environmental Systems & Materials Engineering, with responsibility and accountability for ensuring that ships and submarines are designed and upgraded, and can be operated, in compliance with existing and anticipated environmental requirements while minimizing total ownership cost and manning. This responsibility encompasses legacy platforms and new vessel designs, as well as Fleet operations exercises, and training.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Technical Authority (TA) | 0.750 | 1.685 | 1.500 | 0.000 | 1.500 |
| ***Articles:*** | - | - | - | - | - |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603721N / *Environmental Protection* | **Project (Number/Name)**<br>0401 / *Shipboard Waste Mgmt* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Description:*** Funding in support of TA utilized to develop waste stream design criteria and guidance. This includes system/technology selection, processing capacity, interfaces, shipboard integration, test and qualification protocols, processes and practices, and performance specifications.<br><br>FY19 TA reduced to support Ballast Water Management tasking related to procurement and testing of Navy approved Ballast Water Treatment System.<br><br>***FY 2018 Plans:***<br>- Identify waste management systems for detailed acquisition and evaluation.<br>- Perform a study on Rapid Tank design to minimize residuals and for optimized operation.<br>- Work with Fleet, acquisition programs, and technical authorities to review and provide comments on issues, risks, and opportunities so as minimize the cost and risk to the Navy.<br>- Review emergent ship spills and other oil spill discharge violations and determine root causes.<br>- Identify opportunities to reduce the risk of future oil spill violations and communicate these to the fleet.<br>- Meet with NATO and foreign Navy data exchange partners to leverage lessons learned on afloat environmental compliance.<br>- Continue development of environmental equipment/system requirements documentation, design criteria/ guidance, specification standards, and certification protocols.<br>- Perform assessments of emergent air emission processes and technologies to enable effective compliance at minimal life cycle cost and risk to operations.<br>- Investigate impact of the use of environmentally sound refrigerants on refrigeration systems.<br>***FY 2019 Base Plans:***<br>- Identify waste management systems for detailed acquisition and evaluation.<br>- Work with Fleet, acquisition programs, and technical authorities to review and provide comments on issues, risks, and opportunities so as minimize the cost and risk to the Navy.<br>- Review emergent ship spills and other oil spill discharge violations and determine root causes.<br>- Identify opportunities to reduce the risk of future oil spill violations and communicate these to the fleet.<br>- Meet with NATO and foreign Navy data exchange partners to leverage lessons learned on afloat environmental compliance.<br>- Continue development of environmental equipment/system requirements documentation, design criteria/ guidance, specification standards, and certification protocols.<br>- Perform assessments of emergent air emission processes and technologies to enable effective compliance at minimal life cycle cost and risk to operations. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603721N / *Environmental Protection* | **Project (Number/Name)**<br>0401 / *Shipboard Waste Mgmt* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Continue to investigate impact of environmentally sound refrigerants and refrigerant systems.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Decrease in FY19 funds to support Ballast Water Management tasking related to procurement and testing of Navy approved Ballast Water Treatment System. | | | | | |
| ***Title:*** Liquid Wastes | 2.451 | 2.354 | 2.275 | 0.000 | 2.275 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Navy ships must be able to operate anywhere in the world, train realistically, and visit any port without operational, safety, or health constraints arising due to international, Federal, and local environmental regulations. This effort addresses liquid wastes in two (2) major areas: Marine Sanitation Devices (MSDs) and Marine Pollution Control Devices.<br><br>FY19 decrease due to completion of shipboard piping modifications for long-term assessment of sewage and graywater piping development, prevention, and cleaning.<br><br>***FY 2018 Plans:***<br>- Perform assessments of emergent commercial off the shelf Marine Pollution Control processes and technologies that would enable effective compliance at minimal life cycle cost and risk to operations. Identify systems for detailed acquisition and evaluation<br><br>Oil Pollution Abatement:<br>- Complete installation package for shipboard testing of a commercial centrifugal oil water separator including ship check, installation drawings, and adjudication of Navy ship environmental requirements.<br>- Initiate shipboard evaluation of centrifugal Oil Water Separator (OWS) including system inspection and operational checks.<br>- Continue development of specifications for Navy centrifugal OWS.<br>- Finalize and demonstrate in the Fleet procedures for regenerating membrane systems.<br>- Investigate oil content monitor compatibility with centrifugal OWS.<br><br>Non-Oily Waste:<br>- Complete laboratory test and evaluation of membrane bioreactor layup and startup procedures and tools. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603721N / *Environmental Protection* | **Project (Number/Name)**<br>0401 / *Shipboard Waste Mgmt* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Continue laboratory evaluation of microbial biosensor to assess bioreactor health.<br>- Continue long-term assessment of sewage and graywater piping development, prevention and cleaning.<br>- Initiate shipboard evaluation of vacuum instrumentation isolation<br>***FY 2019 Base Plans:***<br>- Perform assessments of emergent commercial off the shelf Marine Pollution Control processes and technologies that would enable effective compliance at minimal life cycle cost and risk to operations. Identify systems for detailed acquisition and evaluation<br><br>Oil Pollution Abatement:<br>- Perform shipboard evaluation of centrifugal oil water separator (OWS).<br>- Develop specifications for Navy centrifugal OWS.<br>- Initiate laboratory evaluation of alternative membrane coatings.<br>- Initiate laboratory evaluation of commercial Wilden Transfer Pumps.<br>- Begin specification development for submersible pumps.<br>- Investigate commercial oil content monitors for potential new discharge standard.<br>- Refine specifications for Navy small ship OWS.<br><br>Non-Oily Waste:<br>- Complete laboratory evaluation of sludge pretreatment system to support procurement specification development.<br>- Prepare for shipboard evaluation of grease pretreatment system<br>- Complete documentation for new hydrogen sulfide gas sensor.<br>- Continue long-term assessment of sewage and graywater piping development, prevention and cleaning.<br>- Initiate laboratory evaluation of alternative vacuum pumps.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No significant changes from FY18 to FY19. | | | | | |
| ***Title:*** Hazardous Material Control and Management | 1.000 | 0.995 | 1.015 | 0.000 | 1.015 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** A wide variety of Hazardous Materials (HM) are used to construct, operate and maintain Navy ships and submarines. These HMs include cleaning compounds, solvents, adhesives, sealants, corrosion | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603721N / *Environmental Protection* | **Project (Number/Name)**<br>0401 / *Shipboard Waste Mgmt* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| preventive compounds, acids, alkalis, oxidizers, lubricants, functional fluids, and many other products. HM addresses environmental, safety and health risks to ship construction workers, Ship's Force (S/F), and shipyard workers.<br><br>FY19 increase for acquisition, installation and shipboard evaluation of automatic cleaner dispensers, and finalization of commercial item description.<br><br>***FY 2018 Plans:***<br>- Perform assessments of emergent commercial off the shelf hazardous material management processes and pollution prevention technologies that would enable effective compliance at minimal life cycle cost and risk to operations.<br>- Identify hazardous material control/pollution prevention systems for detailed acquisition and evaluation.<br>- Revise the NAVSEA Hazardous Material Avoidance Process.<br>- Identify, research, and evaluate less hazardous or non-hazardous substitutes for high-risk hazardous materials.<br>- Acquire, install and perform shipboard evaluation of automated cleaner dispensers.<br>- Initiate commercial item description for automatic cleaner dispensers.<br>***FY 2019 Base Plans:***<br>- Perform assessments of emergent commercial off the shelf hazardous material management processes and pollution prevention technologies that would enable effective compliance at minimal life cycle cost and risk to operations.<br>- Identify hazardous material control/pollution prevention systems for detailed acquisition and evaluation.<br>- Revise the NAVSEA Hazardous Material Avoidance Process.<br>- Identify, research, and evaluate less hazardous or non-hazardous substitutes for high-risk hazardous materials.<br>- Acquire, install and perform shipboard evaluation of automated cleaner dispensers.<br>- Finalize commercial item description for automatic cleaner dispensers.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No significant changes from FY18 to FY19. | | | | | |
| ***Title:*** Solid Waste Management | 1.190 | 1.000 | 1.050 | 0.000 | 1.050 |
| ***Articles:*** | - | - | - | - | - |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603721N / *Environmental Protection* | **Project (Number/Name)**<br>0401 / *Shipboard Waste Mgmt* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Description:*** Solid Waste Management supports the Act to Prevent Pollution from Ships (APPS) which regulates all garbage discharges from ships at sea.<br><br>FY19 will address APPS compliant Solid Waste Management systems.<br><br>***FY 2018 Plans:***<br>- Perform assessments of emergent commercial off the shelf solid waste management processes and technologies that would enable effective compliance at minimal life cycle cost and risk to operations.<br>- Identify solid waste systems for detailed acquisition and evaluation.<br>- Complete laboratory test and evaluation and prepare final reports on the Act to Prevent Pollution from Ships (APPS) compliant Micro Auto Gasification System.<br><br>***FY 2019 Base Plans:***<br>- Perform assessments of emergent commercial off the shelf solid waste management processes and technologies that would enable effective compliance at minimal life cycle cost and risk to operations.<br>- Identify solid waste systems for detailed acquisition and evaluation.<br>- Begin installation and testing preparation for the shipboard evaluation and Navy ship environmental testing of convertor, Marine Solid Waste Incinerator and/or Micro Auto Gasification System based on laboratory test results.<br>- Refine Navy ship acquisition requirements for Act to Prevent Pollution from Ships (APPS) compliant solid waste processing systems.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No significant changes from FY18 to FY19. | | | | | |
| ***Title:*** Ballast Water Management | 2.700 | 1.736 | 1.836 | 0.000 | 1.836 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** The National Invasive Species Act (NISA) requires the Secretary of Defense to implement a ballast water management program to minimize the risk of introduction of unwanted species and pathogens from releases of ballast water. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603721N / *Environmental Protection* | **Project (Number/Name)**<br>0401 / *Shipboard Waste Mgmt* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| FY19 to support Ballast Water Management tasking related to procurement and testing of Navy approved Ballast Water Treatment System (BWTS).<br><br>***FY 2018 Plans:***<br>- Perform assessments of emergent commercial off the shelf ballast water treatment systems that would enable effective compliance at minimal life cycle cost and risk to operations.<br>- Identify systems for detailed acquisition and evaluation.<br>- Finalize full scale evaluation of two commercial ballast water treatment systems to assess system performance, reliability, operability and maintainability, and suitability as a Navy shipboard system.<br>- Initiate full scale evaluation of one commercial ballast water treatment system to assess system performance, reliability, operability and maintainability, and suitability as a Navy shipboard system.<br>- Perform pierside testing to address efficacy of ballast water exchange.<br>- Determine ship services, consumables, manning required to run and maintain ballast water treatment systems.<br>- Refine Navy ship installation guidance for meeting ballast water discharge standards considering damage control and stability requirements.<br>- Develop ballast water treatment system acquisition strategy.<br><br>***FY 2019 Base Plans:***<br>- Perform assessments of emergent commercial off the shelf ballast water treatment systems that would enable effective compliance at minimal life cycle cost and risk to operations.<br>- Identify systems for detailed acquisition and evaluation.<br>- Begin acquisition of a modified commercial ballast water treatment system for laboratory or pierside evaluation.<br>- Continue full scale evaluation of one commercial ballast water treatment system to assess system performance, reliability, operability and maintainability, and suitability as a Navy shipboard system.<br>- Determine ship services, consumables, manning required to run and maintain ballast water treatment systems.<br>- Refine ballast water treatment system performance specification.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Increase in FY19 funding to support Ballast Water Management tasking related to procurement and testing of Navy approved BWTS. | | | | | |
| ***Title:*** Non-Copper Antifouling | 0.100 | 0.150 | 0.100 | 0.000 | 0.100 |
| ***Articles:*** | - | - | - | - | - |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603721N / *Environmental Protection* | **Project (Number/Name)**<br>0401 / *Shipboard Waste Mgmt* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Description:*** The copper discharges from underwater hull coatings remain a regulatory concern. The effort focuses on characterizing advanced coating systems and their suitability for Navy-unique operational factors such as speed time profiles, drydocking intervals, and maintenance practices.<br><br>FY19 reflects completion of in-situ testing of antifouling coatings.<br><br>***FY 2018 Plans:***<br>- Continue execution in-situ testing and provide periods reports on performance.<br>- Evaluate NAVSEA screening and qualification test requirements for fouling release (with and without biocides) and antifouling coatings.<br>- Identify gaps; develop and execute testing to fill gaps.<br>- Compare results from historical qualification tests with full scale data plus Office of Naval Research (ONR) Intersite Calibration Study and Fouling Release Coating Study data.<br>- Prepare final report with recommendations.<br>- Draft qualification procedure modifications as needed.<br><br>***FY 2019 Base Plans:***<br>- Complete in-situ testing and provide final report on performance.<br>- Complete evaluation of NAVSEA screening and qualification test requirements for fouling release (with and without biocides) and antifouling coatings.<br>- Compare results from historical qualification tests with full scale data plus Office of Naval Research (ONR) Intersite Calibration Study and Fouling Release Coating Study data.<br>- Finalize qualification procedure modifications as needed.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No significant changes from FY18 to FY19. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 8.191 | 7.920 | 7.776 | 0.000 | 7.776 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603721N / *Environmental Protection* | **Project (Number/Name)**<br>0401 / *Shipboard Waste Mgmt* |

**D. Acquisition Strategy**

RDT&E Contracts are Competitive Procurements.

**E. Performance Metrics**

Quarterly Program Reviews

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603721N / *Environmental Protection* | Project (Number/Name)<br>0401 / *Shipboard Waste Mgmt* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ancillary Hardware Development | Various | Misc. Contracts : Not Specified | 19.149 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 19.149 | Continuing |
| Primary Hardware Development | C/CPFF | Oceaneering : Not Specified | 1.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.000 | Continuing |
| Systems Engineering | C/CPFF | John J. McMullen & Son : Not Specified | 4.487 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 4.487 | Continuing |
| | | **Subtotal** | 24.636 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 24.636 | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Software Development | WR | SPAWAR : Charleston, SC | 10.838 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 10.838 | Continuing |
| | | **Subtotal** | 10.838 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 10.838 | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Developmental Test & Evaluation | MIPR | US Army Corps of Engineers : Norfolk, VA | 0.687 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.687 | - |
| Developmental Test & Evaluation | WR | NSWCCD, Bethesda, MD : Bethesda, MD | 208.432 | 6.234 | Nov 2016 | 6.250 | Nov 2017 | 6.800 | Nov 2018 | - | | 6.800 | Continuing | Continuing | Continuing |
| Developmental Test & Evaluation | WR | NSWCIHD : Indian Head, MD | 1.086 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.086 | - |
| Developmental Test & Evaluation | WR | NRL,Wash,DC : Wash,DC | 31.341 | 1.235 | Nov 2016 | 0.948 | Nov 2017 | 0.500 | Nov 2018 | - | | 0.500 | Continuing | Continuing | Continuing |
| Developmental Test & Evaluation | WR | NSWCPD, Philladelphia, PA : Philladelphia, PA | 0.000 | 0.472 | Nov 2016 | 0.472 | Nov 2017 | 0.301 | Nov 2018 | - | | 0.301 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603721N / *Environmental Protection* | Project (Number/Name)<br>0401 / *Shipboard Waste Mgmt* | |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Developmental Test & Evaluation | WR | SPAWARSYSCEN : SD,CA | 12.308 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Developmental Test & Evaluation | WR | Misc. Govt Labs : TBD | 22.975 | 0.250 | Nov 2016 | 0.250 | Nov 2017 | 0.175 | Nov 2018 | - | | 0.175 | 0.000 | 23.650 | - |
| Developmental Test & Evaluation | C/CPFF | SAIC : San Diego, CA | 15.570 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 15.570 | - |
| Developmental Test & Evaluation | C/CPFF | Misc. Contracts : TBD | 13.103 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 13.103 | - |
| Process Control Engineering | C/CPFF | M. Rosenblatt & Sons : Arlington, VA | 6.547 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 6.547 | Continuing |
| Developmental Test & Evaluation | C/CPFF | ONR : Arlington, VA | 0.400 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.400 | Continuing |
| Developmental Test & Evaluation | WR | Naval Postgraduate School : Monterey, CA | 1.800 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.800 | Continuing |
| Process Control Engineering | MIPR | EPA, Hdqtrs : Washington, DC | 0.840 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.840 | Continuing |
| | | **Subtotal** | 315.089 | 8.191 | | 7.920 | | 7.776 | | - | | 7.776 | Continuing | Continuing | N/A |

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Travel | Allot | NAVSEA HQ : Washington, DC | 0.375 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| SBIR Assessment | TBD | Not Specified : Not Specified | 0.227 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.227 | Continuing |
| | | **Subtotal** | 0.602 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | N/A |

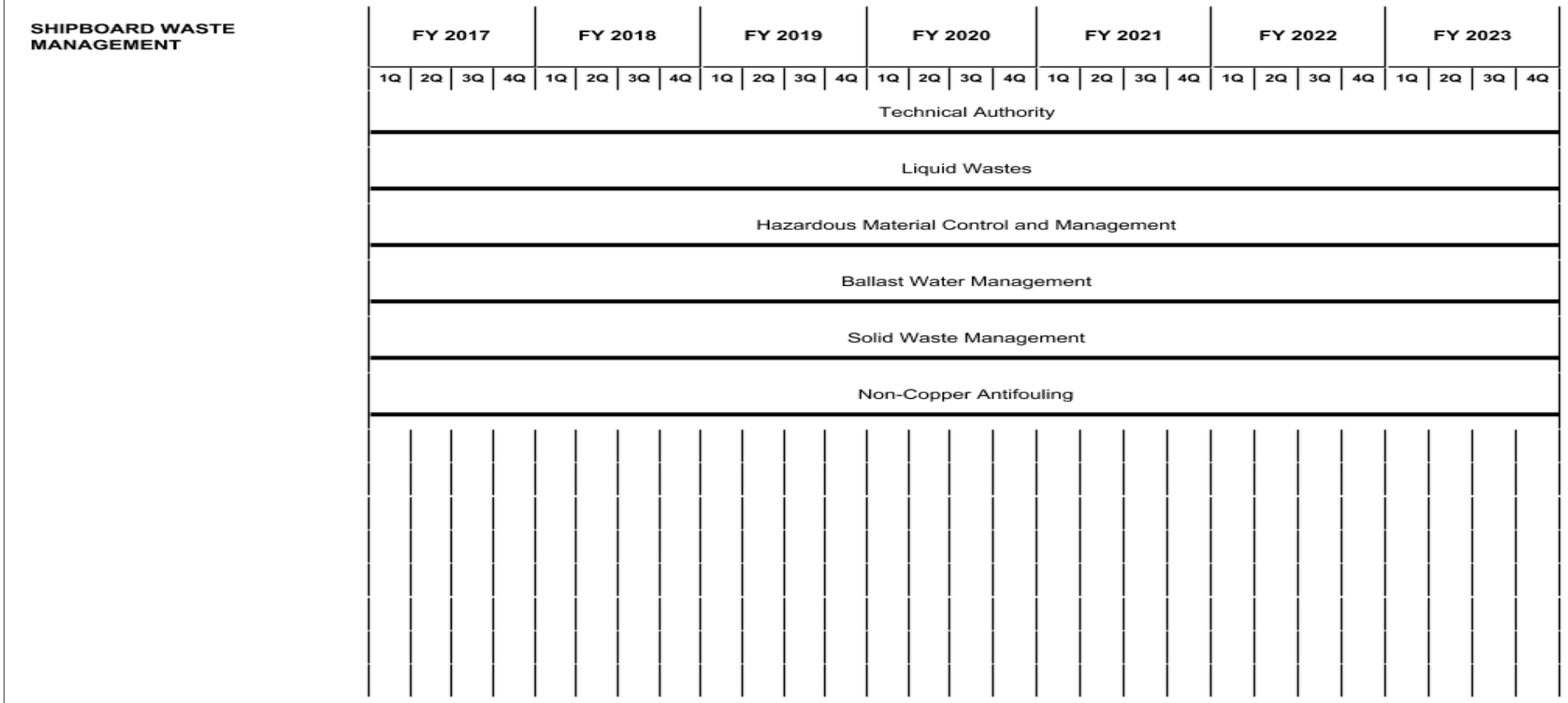
| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 351.165 | 8.191 | | 7.920 | | 7.776 | | - | | 7.776 | Continuing | Continuing | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603721N / *Environmental Protection* | Project (Number/Name)<br>0401 / *Shipboard Waste Mgmt* | |

| | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603721N / *Environmental Protection* | **Project (Number/Name)**<br>0401 / *Shipboard Waste Mgmt* |




*2019OSD - 0603721N - 0401*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603721N / *Environmental Protection* | **Project (Number/Name)**<br>0401 / *Shipboard Waste Mgmt* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***SHIPBOARD WASTE MANAGEMENT*** | | | | |
| Technical Authority | 1 | 2017 | 4 | 2023 |
| Liquid Wastes | 1 | 2017 | 4 | 2023 |
| Hazardous Material Control and Management | 1 | 2017 | 4 | 2023 |
| Ballast Water Management | 1 | 2017 | 4 | 2023 |
| Solid Waste Management | 1 | 2017 | 4 | 2023 |
| Non-Copper Antifouling | 1 | 2017 | 4 | 2023 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603721N / *Environmental Protection* | Project (Number/Name)<br>0817 / *Environmental Sustainability Development (NESDI)* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0817: *Environmental Sustainability Development (NESDI)* | 44.352 | 5.600 | 4.782 | 4.266 | - | 4.266 | 4.439 | 6.120 | 6.237 | 6.358 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Inherent to the realization of the vision outlined in Sea Power 21 are certain environmental consequences that will, to a lesser or greater degree, be an impact on the Navy's ability to fully achieve the strategy outlined in the Navy Capability Pillars (NCP) SEA SHIELD, SEA STRIKE, SEA BASING and FORCEnet and the supporting initiatives of SEA WARRIOR, SEA TRIAL and SEA ENTERPRISE. Readiness and training are primary considerations for determining whether any fighting force is at its peak proficiency. The ability to train our forces in a realistic environment is paramount. Today's reality requires training and operating within environmental constraints (national and international laws and agreements), and searching for alternatives to comply with and alleviate those constraints. Moreover, as we develop new systems and technologies in support of Sea Power 21, the Navy must anticipate potential environmental regulations which, while not currently an issue, could in the future adversely impact our ability to protect and sustain our forces at home and abroad.

This program identifies pervasive Navy shore side environmental requirements and develops and validates information, new processes, and technologies that address requirements that pose significant impact on Naval shore activities in complying with environmental laws, regulations, orders, and policies. The goal of the program is to maximize opportunities for significant cost savings while minimizing personnel liabilities, operational costs, and regulatory oversight and preserving or enhancing the ability of Naval shore activities to accomplish their required missions and functions in support of the Navy's transformational strategy.

Environmental Enabling Capabilities -2 (EEC-2) MAXIMIZE TRAINING AND TESTING RANGE REQUIREMENTS WITHIN ENVIRONMENTAL CONSTRAINTS: This capability addresses environmental impacts and restrictions at Navy land and sea ranges, including munitions testing and manufacturing, to ensure Navy ranges are available to conduct required training and testing operations for the Fleet. Investments in EEC-2 provide validated knowledge, models, and processes to mitigate environmental impacts, restrictions, and costs at Navy training and test ranges to maximize the availability and utilization of the ranges. The results support operational readiness by providing the tools and technologies necessary for sustaining and managing Navy land and sea ranges related to unexploded ordnance (UXO) and munitions, encroachment, air quality, airborne noise, water quality, and wetlands. Capabilities gained include the ability to assess and determine the risks from underwater UXO, the evaluation and prioritization of ordnance contaminated sites for evaluation in environmental programs and the implementation of range specific best management practices by evaluating and modeling available process, procedures, and technologies.

Environmental Enabling Capabilities-3 (EEC-3)PLATFORM MAINTENANCE AND REPAIR WITH MINIMAL ENVIRONMENTAL FOOTPRINT: This capability focuses on minimizing or eliminating environmental impact related to Navy and Marine Corps weapon system repair and maintenance operations. Investments in EEC-3 provide valid knowledge, models, processes, and technologies to minimize regulated emissions, discharges and hazardous material usage during the repair and maintenance of ships, submarines, and surface/sub-surface vehicles and aircraft and air vehicles. The program supports Fleet operational readiness and Navy acquisition communities by investing in information to understand emerging environmental requirements and to develop innovative processes and technologies that result in savings while

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
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| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603721N / *Environmental Protection* | **Project (Number/Name)**<br>0817 / *Environmental Sustainability Development (NESDI)* |

reducing the fleet environmental constraints related to platform maintenance. Capabilities and benefits gained include, but are not limited to, the reduction in the usage of heavy metals used in metal finishing (chromium and cadmium), reduced hazardous air pollutant (HAP) emissions, the development of best management practices and tools to minimize the use of hazardous materials, and the generation of hazardous wastes associated with maintaining and repairing ships, submarines, aircraft, and unmanned vehicles. Results of program investments will be leveraged across weapon system and platform acquisition to ensure continued reduction in lifecycle costs and long-term environmental compliance burdens to the Fleet.

Environmental Enabling Capabilities-4 (EEC-4). SUPPORT SHORE READINESS WITHIN ENVIRONMENTAL CONSTRAINTS: Naval shore establishment requires the capability to operate and maintain facilities and provide waterfront and airfield services to the fleet while complying with applicable environmental regulations and minimizing environmental impacts and costs. The program invests in knowledge and innovative processes and technologies that minimize infrastructure and operational costs, regulated emissions, while minimizing discharges and hazardous material usage from ship (waterfront) and aviation operations. Capabilities and benefits gained under EEC-4 include, reduced costs associated with wastewater treatment, elimination/reduction in the use of HAPs, ozone depleting substances (ODSs), volatile organic compounds (VOCs) and the associated reporting requirements, reduced hazardous waste and disposal costs, and improved storm water management.

Environmental Enabling Capabilities-5 (EEC-5). COST-EFFECTIVE MANAGEMENT OF ENVIRONMENTAL REGULATORY REQUIREMENTS: The environmental compliance regulations require base managers to permit, monitor and report on many processes associated with weapon system and platform operations. Naval shore environmental managers require the capability to efficiently and cost effectively manage these compliance requirements. Under EEC-5, the program invests in improved data collection, methods, and models to assess environmental impacts and ecological risk assessments of Naval Operations on harbors, U.S. waterways, and surrounding communities. Benefits include gaining standardized technical environmental management improvements/techniques related to source control, assessment, and monitoring. EEC-5 also provides validated knowledge, models, processes and technologies to improve environmental monitoring and reporting, and to reduce the cost of compliance with regulations applicable to coastal contamination and contaminated sediments.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Maximize Training & Testing Requirements Within Environmental Constraints | 1.095 | 0.850 | 0.735 | 0.000 | 0.735 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY18 funds will be applied to:<br>- Continue providing validated knowledge, models, and processes to mitigate environmental impacts, restrictions, and costs of Navy training and test ranges to maximize the availability and utilization of the ranges.<br>- Continue the following initiatives: X-ray inspection system to demilitarize targets; Analysis of the Long-Term Fate of Munitions Constituents on Terrestrial Sites.<br>- Complete the initiative: Underwater low environmental impact munitions breaching technology to better characterize environmental impacts of munitions on training ranges and munitions response sites. | | | | | |
| ***FY 2019 Base Plans:***<br>FY 2019 Base Plans: | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603721N / *Environmental Protection* | **Project (Number/Name)**<br>0817 / *Environmental Sustainability Development (NESDI)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Continue providing validated knowledge, models, and processes to mitigate environmental impacts, restrictions, and costs of Navy training and test ranges to maximize the availability and utilization of the ranges.<br>- Continue the initiative: Analysis of the Long-Term Fate of Munitions Constituents on Terrestrial Sites.<br>- Complete the initiatives: X-ray inspection system to demilitarize targets.<br>- Program to begin to evaluate Cost Effective Main Charge Remediation of Insensitive Munitions for Range Clearance.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No significant changes from FY18 to FY19. | | | | | |
| ***Title:*** Platform Maintenance and Repair With Minimal Environmental Footprint | 1.130 | 1.064 | 1.007 | 0.000 | 1.007 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY18 funds will be applied to:<br>- Continue evaluations and demonstrations of innovative solutions for difficult and persistent aviation and shipyard platform sustainment issues related to hexavalent chrome, cadmium, volatile organic compounds (VOC) hazardous air pollutants (HAP) and other hazardous compounds at Naval Aviation Systems Command Fleet Readiness Centers and the Navy's shipyards.<br>- Complete the initiatives: Advanced Non-Chromate Primers and Coatings, Portable Treatment for Ship Material Removal Processes, Low-VOC and Low-HAP Wipe Solvent and Paint Thinner Demonstration/Validation.<br>***FY 2019 Base Plans:***<br>FY 2019 Base Plans:<br>- Continue providing innovative solutions for difficult and persistent shipyard environmental compliance issues.<br>- Continue the initiatives: Demonstration Of Non-Chromated Adhesive Bond Primer For Metal Repair Bonding, Non-Isocyanate Polyurethane-Free Formulation Coatings for Aircraft and Support Equipment, Multi-Functional Surface Preparation Technology for Maintenance Painting, Demonstration of Optimized non-NMP (n-Methyl-2-pyrrolidone) Solvents for Immersion Chemical Depainting, Initiation Decision Report of Laser Coating Removal on Naval Aircraft Components, Elimination of Hexavalent Chromium from Magnesium Conversion Coating Processes at Fleet Readiness Centers, Low VOC Primers for Ground Support Equipment Application. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603721N / *Environmental Protection* | **Project (Number/Name)**<br>0817 / *Environmental Sustainability Development (NESDI)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Complete the initiatives: User Friendly Oxygen Cleaning Alternatives to Navy Oxygen Cleaning (NOC), Enhanced Trivalent Chromium Pretreatment for Improved Coloration and Corrosion Performance of Aluminum Substrates, Naval Air Systems Command Solutions for Engine Washing.<br>- Program to begin to examine Electromagnetic Interference Shielding Tape, Replacement of Cadmium in GSE Avionics Applications.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No significant changes from FY18 to FY19. | | | | | |
| ***Title:*** Support Shore Readiness within Environmental Constraints | 1.505 | 1.187 | 1.039 | 0.000 | 1.039 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY18 funds will be applied to:<br>- Continue evaluations and demonstrations of innovative solutions to minimize regulated emissions, discharges and hazardous material usage resulting specifically from waterfront support, aviation support, and other base operations.<br>- Continue the initiatives: Analysis of Regulated Garbage Management Processes to Ensure Compliance with Animal and Plant Health Inspection Service Regulations, Evaluation and Implementation of Compliance Options for National Pollutant Discharge Elimination System (NPDES) Cooling Water Intake Structures at Existing Facilities, Quantification of Polychlorinated Biphenyls (PCB) Paint Volatilization, Demonstration of New Strategies for Enhanced Monitored Natural Recovery at Navy Sediment Sites, Diver-less Deployment System for In-Situ Sediment Samplers, Improved Dewatering of Dredged Sediment, NPDES Copper Effluent Control System.<br>- Complete the initiatives: Surface Cleaning of Drydock Floors, Dry Dock Sediment Management.<br>***FY 2019 Base Plans:***<br>FY 2019 Base Plans:<br>- Continue the initiatives: Demonstration of New Strategies for Enhanced Monitored Natural Recovery at Navy Sediment Sites, Improved Dewatering of Dredged Sediment, NPDES Copper Effluent Control System.<br>- Continue optimization of ship to shore regulated garbage management, improved dewatering of dredge sediment and demonstration of new strategies for enhanced monitored natural recovery at Navy sediment sites. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603721N / *Environmental Protection* | **Project (Number/Name)**<br>0817 / *Environmental Sustainability Development (NESDI)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Complete the initiatives: Analysis of Regulated Garbage Management Processes to Ensure Compliance with Animal and Plant Health Inspection Service Regulations, Evaluation and Implementation of Compliance Options for NPDES Cooling Water Intake Structures at Existing Facilities, Quantification of Polychlorinated Biphenyls (PCB) Paint Volatilization, Diver-less Deployment System for In-Situ Sediment Samplers.<br>- Under Pier Sediment Pile Assessment Tools to be evaluated and started.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No significant change from FY18 to FY19. | | | | | |
| ***Title:*** Cost-Effective Management of Environmental Regulatory Requirements | 1.870 | 1.681 | 1.485 | 0.000 | 1.485 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY18 funds will be applied to:<br>- Continue providing validated knowledge, models, processes and systems to improve environmental monitoring and reporting, and reduce the cost of compliance with regulations and management of coastal contamination and contaminated sediments.<br>- Continue the initiatives: Evaluation of Alternative Groundwater Supply Sources from a Safe Drinking Water Act Viewpoint, Stable Carbon Isotopes for Tracing in situ Royal Demolition eXplosive (RDX) Remediation, Superhydrophobic Coating for Corrosion Prevention and Leachate Impedance, Forward Looking Infrared Camera for Advanced Discharge Characterization, Smart Electronic Tools for Navy Environmental Compliance Monitoring and Reporting, Utility Vault Water Treatment, Preventative Management of Contaminated Silt, Using Stable-Isotope Labeled Tracers to Validate Natural Attenuation of RDX in Groundwater, In Situ Treatment of 1,4-Dioxane using Enhanced Biodegradation, Demonstration of Improved Toxicity Methodology to Link Stormwater Discharges to Receiving Water Impacts, Sewer Gas Elimination Technology, Impact of Sediment Resuspension by Propeller Wash and Shore Sediment Dynamics on Remediation Options, Study of Waste Management and Minimization for Aqueous Film Forming Foam (AFFF) Wastewater, Addressing Temporal Variability in Industrial Buildings during Vapor Intrusion Assessments, Demonstrating the Effectiveness of Novel Treatment Technologies for the Removal of Poly- and Perfluoroalkyl (PFOS/PFOA) Substances from Groundwater, Enterprise-wide Hazardous Material Standardization and Minimization of General Use Consumables, In-situ Automatic Stormwater Sampling Device for Use at Tidally Impacted Sampling Locations, Background analysis and tracer study to identify metal contaminant source contributions to stormwater runoff, Biochar Adsorption | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603721N / *Environmental Protection* | **Project (Number/Name)**<br>0817 / *Environmental Sustainability Development (NESDI)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| for Dry Dock Effluent, Development and Demonstration of a Portable, Temporary Barrier to Aid in Cargo and Equipment Inspections to Prevent Brown Treesnake Dispersal, Implementation of Biotic Ligand Model-Based Water Quality Standards for Copper at Navy Sites, Source Metal Particle Removal for Stormwater Compliance, Business Processes and Requirements Enabling Technology Integration.<br>- Complete the initiatives: Initiation Decision Report Passive Sampling for Stormwater, A Comprehensive Analysis and Strategy for Contaminated Sediment Management.<br>***FY 2019 Base Plans:***<br>FY 2019 Base Plans:<br>- Complete the initiatives: Forward Looking Infrared Camera for Advanced Discharge Characterization, Smart Electronic Tools for Navy Environmental Compliance Monitoring and Reporting, Study of Waste Management and Minimization for AFFF Wastewater.<br>- New program evaluate and demonstration/validation of Air Filtration for Indoor Air Quality, Stormwater Piping-Based Pollutant Best Management Practice, Improving Site Closure Decision-Making with Time-Integrated Groundwater Samples.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No significant changes from FY18 to FY19. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 5.600 | 4.782 | 4.266 | 0.000 | 4.266 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

This project is categorized as Non-ACAT (Non Acquisition). The project delivers a broad spectrum of products that require a variety of acquisition processes to implement. Equipment products for naval stations and other mission funded activities are often procured directly through the base operating budget. Equipment products for Shipyards and other Navy Working Capital Fund (NWCF) activities costing over $250K are procured through their Capital Investment Program (CIP). For both types of activities, equipment products costing less than $250K, and process changes not requiring the purchase of new equipment such as consumable material or product substitutions, are funded through the activity's operating budgets. Occasionally there is a technology that must be implemented as a specialized facility. These are acquired through the Military Construction (MILCON) Program. All these acquisition processes are pursued using a common strategy that satisfies the needs of all

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603721N / *Environmental Protection* | **Project (Number/Name)**<br>0817 / *Environmental Sustainability Development (NESDI)* |

the critical stakeholders: 1) fleet end user; 2) funding sponsor for the Navy end user; 3) other stakeholders with cognizance over the Navy process or operation being changed, 4) cognizant environmental federal, state, and local regulators; and 5) the private or government organization that will produce the product.

**E. Performance Metrics**

Quarterly Budget Reviews

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603721N / *Environmental Protection* | **Project (Number/Name)**<br>0817 / *Environmental Sustainability Development (NESDI)* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EEC 2 | Various | EXWC : PT HUENEME, CA | 5.585 | 0.740 | Oct 2016 | 0.500 | Oct 2017 | 0.410 | Oct 2018 | - | | 0.410 | Continuing | Continuing | Continuing |
| EEC 2 | Various | SSC : SAN DIEGO, CA | 5.549 | 0.355 | Oct 2016 | 0.350 | Dec 2017 | 0.325 | Dec 2018 | - | | 0.325 | Continuing | Continuing | Continuing |
| EEC 3 | WR | NAWC : PATUXENT RIVER, MD | 1.916 | 0.175 | Jul 2017 | 0.202 | Mar 2018 | 0.135 | Mar 2019 | - | | 0.135 | Continuing | Continuing | Continuing |
| EEC 3 | Various | NSWC : BETHESDA, MD | 3.630 | 0.220 | May 2017 | 0.192 | Nov 2017 | 0.175 | Feb 2019 | - | | 0.175 | Continuing | Continuing | Continuing |
| EEC 3b | Various | EXWC : PT HUENEME, CA | 1.307 | 0.105 | May 2017 | 0.050 | Mar 2018 | 0.077 | Mar 2019 | - | | 0.077 | Continuing | Continuing | Continuing |
| EEC 4 | Various | EXWC : PT HUENEME, CA | 7.780 | 0.600 | Mar 2017 | 0.540 | Mar 2018 | 0.404 | Mar 2019 | - | | 0.404 | Continuing | Continuing | Continuing |
| EEC 4 | Various | NSWC : BETHESDA, MD | 3.813 | 0.575 | Oct 2016 | 0.307 | Nov 2017 | 0.260 | Nov 2018 | - | | 0.260 | Continuing | Continuing | Continuing |
| EEC 4a | Various | SSC : SAN DIEGO, CA | 3.235 | 0.330 | Jan 2017 | 0.340 | Jan 2018 | 0.375 | Apr 2019 | - | | 0.375 | Continuing | Continuing | Continuing |
| EEC 5 | Various | EXWC : PT HUENEME, CA | 2.986 | 0.590 | Jan 2017 | 0.535 | Nov 2017 | 0.433 | Nov 2018 | - | | 0.433 | Continuing | Continuing | Continuing |
| EEC 5 | Various | SSC : SAN DIEGO, CA | 1.540 | 0.270 | Feb 2017 | 0.395 | Feb 2018 | 0.350 | Feb 2019 | - | | 0.350 | Continuing | Continuing | Continuing |
| EEC 5 | Various | NAWC : PATUXENT RIVER, MD | 1.187 | 0.140 | Jun 2017 | 0.050 | Jun 2018 | 0.100 | Jun 2019 | - | | 0.100 | Continuing | Continuing | Continuing |
| EEC 5 | Various | NSWC : BETHESDA, MD | 1.750 | 0.540 | Jan 2017 | 0.504 | Jan 2018 | 0.387 | Jan 2019 | - | | 0.387 | Continuing | Continuing | Continuing |
| EEC 5 | WR | NAWCWD : CHINA LAKE, CA | 1.145 | 0.215 | Oct 2016 | 0.122 | Dec 2017 | 0.140 | Dec 2018 | - | | 0.140 | Continuing | Continuing | Continuing |
| EEC 5 | WR | NAWC : LAKE HURST, NJ | 0.716 | 0.115 | Nov 2016 | 0.075 | Nov 2017 | 0.075 | Nov 2018 | - | | 0.075 | Continuing | Continuing | Continuing |
| EEC 3 | WR | FRC - SE : JACKSONVILLE, FL | 1.305 | 0.380 | Feb 2017 | 0.380 | May 2018 | 0.380 | May 2019 | - | | 0.380 | Continuing | Continuing | Continuing |
| EEC 3 | Various | NSWC : San Diego, CA | 0.000 | 0.060 | Jun 2017 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603721N / *Environmental Protection* | **Project (Number/Name)**<br>0817 / *Environmental Sustainability Development (NESDI)* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EEC 3 | WR | FRC - CE : Cherry Point, NC | 0.320 | 0.060 | Jun 2017 | 0.075 | Jun 2018 | 0.075 | Jun 2019 | - | | 0.075 | Continuing | Continuing | Continuing |
| EEC 3 | Various | FRC-SW : San Diego, CA | 0.588 | 0.130 | Mar 2017 | 0.165 | Mar 2018 | 0.165 | Mar 2019 | - | | 0.165 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 44.352 | 5.600 | | 4.782 | | 4.266 | | - | | 4.266 | Continuing | Continuing | N/A |

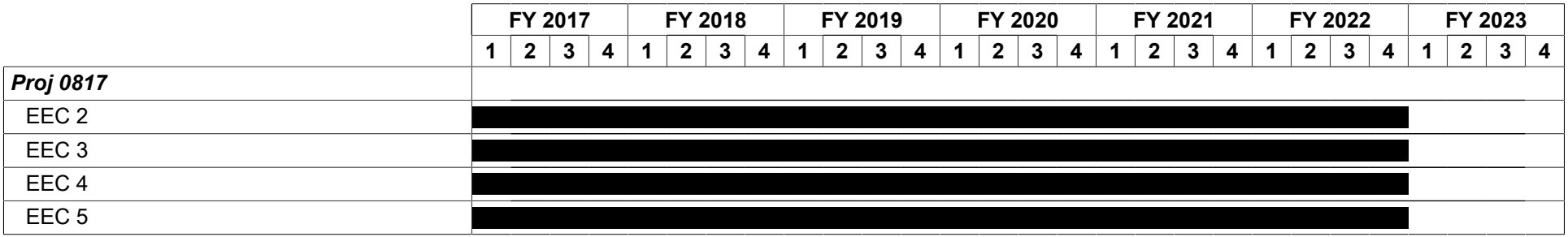
**Remarks**

Performing Activities: Naval Surface Warfare Center, Carderock Division (NSWC/CD); Engineering and Expeditionary Warfare Center (EXWC), Port Hueneme, CA; Naval Surface Warfare Center, Indian Head Division (NSWC/IH); Space and Warfare Systems Center, San Diego (SSC/SD); Naval Air Warfare Center Aircraft Division Patuxent River (NAWCAD/PAX); Naval Air Warfare Center (NAWCWD/China Lake); Naval Air Warfare Center Aircraft Division Lakehurst (NAWCAD/Lakehurst); Fleet Readiness Center Southeast, Jacksonville FL (FRC-SE); Fleet Readiness Center Southwest, San Diego (FRC-SW), Fleet Readiness Center East, Cherry Point (FRC-CE). Total Prior Years Cost: Subtotal does not include performing activities from prior years that are no longer performing activities. Award Dates: About 55% of the project is executed via contracts awarded by the performing activities.

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 44.352 | 5.600 | | 4.782 | | 4.266 | | - | | 4.266 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603721N / *Environmental Protection* | **Project (Number/Name)**<br>0817 / *Environmental Sustainability Development (NESDI)* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603721N / *Environmental Protection* | **Project (Number/Name)**<br>0817 / *Environmental Sustainability Development (NESDI)* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 0817*** | | | | |
| EEC 2 | 1 | 2017 | 4 | 2022 |
| EEC 3 | 1 | 2017 | 4 | 2022 |
| EEC 4 | 1 | 2017 | 4 | 2022 |
| EEC 5 | 1 | 2017 | 4 | 2022 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | | | | | R-1 Program Element (Number/Name)<br>PE 0603721N / *Environmental Protection* | | | | Project (Number/Name)<br>9204 / *Marine Mammal Research* | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| 9204: *Marine Mammal Research* | 46.769 | 5.326 | 4.512 | 4.769 | - | 4.769 | 4.905 | 5.298 | 5.404 | 5.507 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The Navy has been and will continue to be subject to litigation with regard to the potential injuring, killing or biologically significant disturbance of marine animals by the use of intense underwater sound. Since Fleet operation and training areas coincide with known or probable habitats, migration routes, or breeding areas of marine mammals and other protected marine species, the possibility exists that such incidents are likely to continue in the future. The increasing public interest and pressure has resulted in escalating Fleet costs. For example, Fleet and SYSCOM development activities have been interrupted; modified, or altogether cancelled and environmental regulations have, among other things, required new ship construction shock trials to obtain Federal permits and conduct extensive environmental planning that can take several years to complete. The incorporation of mitigation measures in Fleet training operations to minimize the potential adverse effects on protected marine animals can significantly reduce the realism of these operations. In addition, the testing, evaluation, and deployment of new sonar detection and monitoring systems that use active acoustics are under intense public scrutiny for their potential adverse effects on whales and other marine mammals. Navy needs scientific evidence to substantiate its claims of limited or inconsequential adverse effects to marine life from operations.

This project primarily focuses on the development of planning, monitoring, and mitigating tools to aid the Fleet in minimizing contact with and the potential harassment of protected marine animals during operations, exercises, training, and undersea surveillance and weapons testing. These new capabilities will encompass historical and newly acquired data and analytical models that together can predict marine animal habitats (where they are likely to be), and their natural and expected behavior (diving patterns, prey localization, calling activity, etc.). This project consists of three major areas that will help ensure Navy compliance with the Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA).
These areas are (1) Marine Ecology and Population Dynamics - determine the likelihood of the presence of marine mammals or other protected species by developing habitat and ecological models. Refine marine animal survey techniques to optimize the accuracy of abundance estimates in small ocean regions of Navy interest.
(2) Criteria, Thresholds, and Mitigation - Establish criteria and thresholds from which to measure potential impact on marine mammals and other marine species from Navy training operations. Determine the effectiveness and usefulness of various mitigation measures in relation to the potential impact of Navy operations on marine mammals; and (3) Mitigation Methodologies - Determine the observation, detection and classification measures required to develop effective monitoring and mitigation procedures for Fleet and SYSCOM use. Focus on improving marine animal monitoring capabilities over current methods by developing new technologies or improving existing technologies that improve monitoring and mitigation effectiveness, reduce cost and minimize impacts on readiness activities.

| **B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** |
|---|---|---|---|---|---|
| ***Title:*** Marine Ecology and Population Dynamics | 0.871 | 0.815 | 0.900 | 0.000 | 0.900 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603721N / *Environmental Protection* | **Project (Number/Name)**<br>9204 / *Marine Mammal Research* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Continue ongoing research on the topics of density estimation from passive acoustic monitoring, development of tools for acoustic-only behavioral response studies, and standards/metrics development. Ongoing work on the topic of density estimation from passive acoustic monitoring is focused on the fieldwork/data collection stage in FY 2018. The ongoing work on the topic of standards/metrics development is focused on continued development of the proposed passive acoustic monitoring metadata database system.<br><br>Three studies are expected to be completed in FY2018:<br>-Developing tools for acoustic-only behavioral response studies at Navy instrumented ranges,<br>-Standardization of auditory evoked potential audiometry methods to ensure comparable data inclusion in a national database, and<br>-Acoustical Society of America (ASA) standard on towed passive acoustic systems.<br><br>One study was initiated in FY2018 in response to a need to develop an automated sonar detector in order to establish consistency amongst projects analyzing passive acoustic data for potential impacts from the use of sonar. | | | | | |
| ***FY 2019 Base Plans:***<br>Continue ongoing research on the topics of density estimation from passive acoustic monitoring, standards/ metrics development, and development of an automated sonar detector. Ongoing work on the topic of density estimation from passive acoustic monitoring are in the height of the fieldwork/data collection stage in FY2019. The ongoing work on the topic of standards/metrics development is now in the second half of the project and should be focused on refinements/testing of the passive acoustic monitoring metadata database system and standards development. The ongoing work to develop an automated sonar detector will be focused on comparing available detectors to determine which one is performing the best.<br><br>None of the ongoing studies in these topic areas are scheduled to be completed in FY2019.<br><br>One study is expected to be initiated in FY2019 in response to a need to collect data on potential impacts to coral from Navy activities. In addition, based on feedback from the Fleets and SYSCOMS, there is a need for continued investment in passive acoustic data analysis tools in FY2019. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603721N / *Environmental Protection* | **Project (Number/Name)**<br>9204 / *Marine Mammal Research* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| No significant changes from FY18 to FY19. | | | | | |
| ***Title:*** Criteria and Thresholds, Physiology and Behavior, and Effects of Sound | 2.732 | 2.486 | 2.654 | 0.000 | 2.654 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Continue ongoing research on the topics of hearing (in birds, monk seals, harbor porpoise), temporary threshold shift (in harbor porpoises and bottlenose dolphins), effects on fish from underwater explosions, and behavioral response studies (beaked whales, fin whales, sperm whales). Ongoing studies in these topic areas are all in the middle of the data collection/fieldwork stage in FY2018.<br><br>Two studies are expected to be completed in FY2018:<br>-Hawaiian monk seal auditory hearing study.<br>-Blainville's beaked whale behavioral risk function for Hawaiian populations.<br><br>Two studies were initiated in FY2018 in response to a need to collect in-situ explosive sound characterization and propagation data and harbor seal hearing and temporary threshold shift. Funding in these topic areas is particularly important because the results are needed by early 2020 to update the criteria and thresholds for the Phase IV acoustic effects modeling. | | | | | |
| ***FY 2019 Base Plans:***<br>Continue ongoing research on the topics of hearing (in birds, harbor porpoises and harbor seals), temporary threshold shift (in harbor porpoises and harbor seals), effects on fish from underwater explosions, behavioral response studies (beaked whales, fin whales, sperm whales), and in-situ explosive sound and propagation characterization. Most ongoing studies are in the middle of the data collection/fieldwork stage in FY2019, but two projects are the final data analysis and report writing stage.<br><br>Two studies are expected to be completed in FY2019:<br>-Frequency-dependent growth and recovery of temporary threshold shift in bottlenose dolphins, and<br>-Temporary threshold shift in harbor porpoises due to naval sonar sounds and recovering of hearing.<br><br>Funding in this topic area is particularly important because the results are needed by the end of 2020 to update the criteria and thresholds for the Phase IV acoustic effects modeling. If emergent needs are identified in FY2018, then they would need to be funded in late FY2018/early 2019 to meet the 2020 goal. | | | | | |
| ***FY 2019 OCO Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603721N / *Environmental Protection* | **Project (Number/Name)**<br>9204 / *Marine Mammal Research* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>The increase in funding from FY18 to FY19 can be attributed to the study on in-situ explosive sound and propagation characterization ramping up into the fieldwork/testing phase in FY19. | | | | | |
| ***Title:*** Mitigation Methodologies: Monitoring, New Technology, and Risk Assess | 1.723 | 1.211 | 1.215 | 0.000 | 1.215 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Continue ongoing research on passive acoustic monitoring technology, tagging demonstrations, and development of the M3R (Marine Mammal Monitoring on Navy Ranges) system. All ongoing efforts are in the data collection/fieldwork phase and in some cases are in the analysis phase.<br><br>Three studies are expected to be completed in FY2018:<br>-Integrated Real-Time Autonomous Passive Acoustic Monitoring (IRAP) System,<br>-Extended duration acoustic tagging of right whales, and<br>-High fidelity acoustic and fine-scale movement tags to enable behavioral response research on deep diving whales.<br><br>Once the existing projects are completed and an analysis of the status of the research is conducted, then new needs will be identified in FY2018 for follow-on research.<br><br>***FY 2019 Base Plans:***<br>Continue ongoing research on monitoring technology and development of the M3R (Marine Mammal Monitoring on Navy Ranges) system.<br><br>None of the ongoing studies are scheduled to be completed in FY2019.<br><br>After an analysis of the status of the passive acoustic monitoring technologies and tagging demonstrations are complete, it is anticipated that there will be a need to fund follow-on efforts in FY 2019.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603721N / *Environmental Protection* | **Project (Number/Name)**<br>9204 / *Marine Mammal Research* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| No significant change from FY18 to FY19. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 5.326 | 4.512 | 4.769 | 0.000 | 4.769 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

RDTEN Contracts are Competitive Procurements.

**E. Performance Metrics**

Quarterly Program Reviews

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603721N / *Environmental Protection* | Project (Number/Name)<br>9204 / *Marine Mammal Research* | |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mar Ecol & Pop Dynamics | Various | EXWC : Port Hueneme, CA | 1.872 | 0.550 | Oct 2016 | 0.555 | Nov 2017 | 0.745 | Oct 2018 | - | | 0.745 | Continuing | Continuing | Continuing |
| Criteria & Thresholds | SS/CPFF | NMMF : San Diego, CA | 0.000 | 0.135 | Oct 2016 | 0.049 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.184 | - |
| Mitigation Methods | SS/CPFF | SDSU : San Diego, CA | 0.000 | 0.216 | Oct 2016 | 0.358 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.574 | - |
| Criteria & Thresholds | SS/CPFF | SEAMARCO : Netherlands | 0.000 | 0.276 | Oct 2016 | 0.040 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.316 | - |
| Mitigation Methods | WR | OASIS Technologies, Inc. : Lexington, MA | 1.110 | 0.228 | Oct 2016 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Criteria & Thresholds | SS/CPFF | U Saint Andrews : United Kingdom | 0.000 | 0.163 | Oct 2016 | 0.343 | Nov 2017 | 0.400 | Oct 2018 | - | | 0.400 | 0.000 | 0.906 | - |
| Mitigation Methods | SS/CPFF | Biowaves : San Diego, CA | 0.000 | 0.139 | Oct 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.139 | - |
| Mitigation Methods | SS/CPFF | Syracuse U : Syracuse, NY | 0.000 | 0.000 | | 0.030 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.030 | - |
| Criteria & Thresholds | SS/CPFF | WHOI : Falmouth, MA | 0.000 | 0.000 | | 0.138 | Nov 2017 | 0.200 | Oct 2018 | - | | 0.200 | 0.000 | 0.338 | - |
| Mitigation Methods | WR | SPAWAR : San Diego, CA | 0.861 | 0.127 | Jan 2017 | 0.085 | Nov 2017 | 0.100 | Oct 2018 | - | | 0.100 | Continuing | Continuing | Continuing |
| Criteria & Thresholds | SS/CPFF | MARECOTEL : Seabeck, WA | 0.000 | 0.000 | | 0.560 | Nov 2017 | 0.600 | Oct 2018 | - | | 0.600 | 0.000 | 1.160 | - |
| Mitigation Methods | SS/CPFF | Scripps Institute : San Diego, CA | 0.500 | 0.251 | Jan 2017 | 0.297 | Nov 2017 | 0.200 | Oct 2018 | - | | 0.200 | Continuing | Continuing | Continuing |
| Criteria & Thresholds | SS/CPFF | U Washington : Seattle, WA | 0.000 | 0.000 | | 0.403 | Nov 2017 | 0.300 | Oct 2018 | - | | 0.300 | 0.000 | 0.703 | - |
| Mitigation Methods | SS/CPFF | Oregon State Univ : OR & HI | 0.606 | 0.148 | Jan 2017 | 0.055 | Nov 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Criteria & Thresholds | Various | EXWC : Port Hueneme, CA | 0.000 | 0.000 | | 0.647 | Jan 2018 | 0.651 | Jan 2019 | - | | 0.651 | 0.000 | 1.298 | - |
| Mar Ecol & Pop Dynamics | WR | NAVAIR : Lakehurst, NJ | 0.302 | 0.075 | Oct 2016 | 0.130 | Nov 2017 | 0.075 | Oct 2018 | - | | 0.075 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603721N / *Environmental Protection* | Project (Number/Name)<br>9204 / *Marine Mammal Research* | |

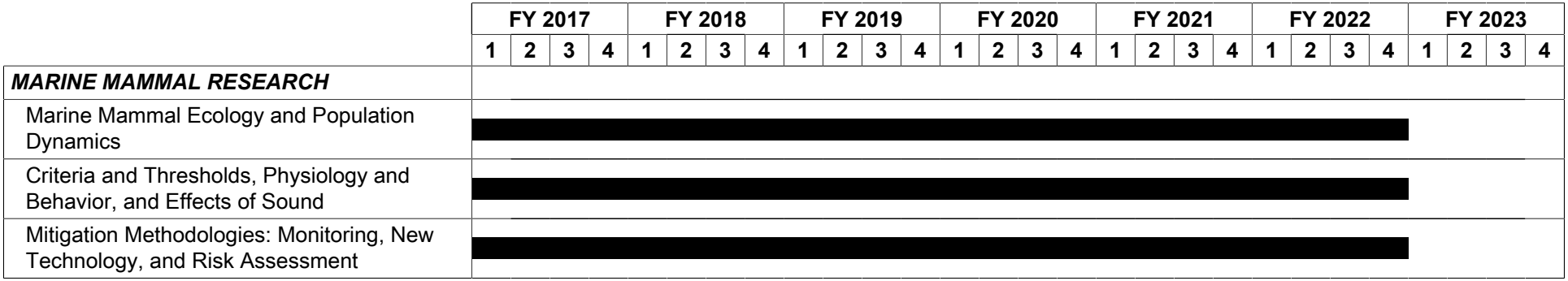
**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mitigan Methods | Various | EXWC : Port Hueneme, CA | 0.000 | 0.000 | | 0.183 | Jan 2018 | 0.515 | Jan 2019 | - | | 0.515 | Continuing | Continuing | Continuing |
| Mar Ecol & Pop Dynamics | SS/CPFF | BMC Inc. : Chicago, IL | 0.290 | 0.151 | Jan 2017 | 0.100 | Nov 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Mitigation Methods | WR | NUWC : Newport, RI | 10.043 | 0.614 | Jan 2017 | 0.194 | Nov 2017 | 0.400 | Oct 2018 | - | | 0.400 | Continuing | Continuing | Continuing |
| Mar Ecol & Pop Dynamics | WR | NPGS : Monterey, CA | 3.549 | 0.030 | Oct 2016 | 0.030 | Nov 2017 | 0.030 | Oct 2018 | - | | 0.030 | Continuing | Continuing | Continuing |
| Mar Ecol & Pop Dynamics | MIPR | NOAA: Various : La Jolla, CA | 3.446 | 0.065 | Jan 2017 | 0.000 | | 0.050 | Oct 2018 | - | | 0.050 | Continuing | Continuing | Continuing |
| Mitigation Methods | SS/CPFF | Scripps Institute : La Jolla, CA | 9.715 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Mitigation Methods | SS/CPFF | Oregon State Univ. : Corvallis, OR | 2.066 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Criteria & Thresholds | WR | NUWC : Newport, RI | 0.000 | 0.000 | | 0.000 | | 0.100 | Oct 2018 | - | | 0.100 | 0.000 | 0.100 | - |
| Criteria & Thresholds | SS/CPFF | SPAWAR : San Diego, CA | 3.775 | 0.000 | | 0.315 | Nov 2017 | 0.403 | Oct 2018 | - | | 0.403 | Continuing | Continuing | Continuing |
| Criteria & Thresholds | SS/CPFF | Cascadia Research Collective : Olympia, WA | 6.390 | 1.859 | Oct 2016 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Criteria & Thresholds | SS/CPFF | San Diego State Univ : San Diego, CA | 2.244 | 0.299 | Oct 2016 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 46.769 | 5.326 | | 4.512 | | 4.769 | | - | | 4.769 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 46.769 | 5.326 | | 4.512 | | 4.769 | | - | | 4.769 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603721N / *Environmental Protection* | **Project (Number/Name)**<br>9204 / *Marine Mammal Research* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603721N / *Environmental Protection* | **Project (Number/Name)**<br>9204 / *Marine Mammal Research* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***MARINE MAMMAL RESEARCH*** | | | | |
| Marine Mammal Ecology and Population Dynamics | 1 | 2017 | 4 | 2022 |
| Criteria and Thresholds, Physiology and Behavior, and Effects of Sound | 1 | 2017 | 4 | 2022 |
| Mitigation Methodologies: Monitoring, New Technology, and Risk Assessment | 1 | 2017 | 4 | 2022 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603721N / *Environmental Protection* | Project (Number/Name)<br>9205 / *Marine Mammal Settlement* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9205: *Marine Mammal Settlement* | 0.000 | 0.000 | 3.000 | 3.000 | - | 3.000 | 3.000 | 0.000 | 0.000 | 0.000 | 0.000 | 9.000 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The Navy developed the Surveillance Towed Array Sensory System (SURTASS) Low Frequency Active (LFA) sonar system to meet the requirement for improved capability to detect quieter and harder to find foreign submarines at greater distances. The Navy employs SURTASS LFA systems onboard up to four U.S. Navy surveillance ships for routine training, testing, and military operations in the Atlantic, Pacific, and Indian Oceans and the Mediterranean Sea. Employment of these systems has been the subject of litigation over the last two decades. The U.S. Navy, the National Oceanic and Atmospheric Administration (NOAA), and the Natural Resources Defense Council et al. entered into a settlement agreement, which has been filed with the U.S. District Court for the Northern District of California, to resolve claims alleged by the plaintiffs that the Navy and NOAA violated the Marine Mammal Protection Act (MMPA), the Endangered Species Act (ESA), and the National Environmental Policy Act (NEPA). The purpose of this funding is to comply with the terms of the settlement agreement filed with the court. Under the terms of the settlement, the Navy agrees to spend $9M over the course of three years from fiscal year 2018 through 2020 to fund research projects within the following research topic areas: 1) Developing capacity to protect acoustic habitats, including in national marine sanctuaries managed under the National Marine Sanctuaries Act 16 U.S.C. 1431 et seq., and high-risk areas for protected species; 2) improve marine mammal density and distribution modeling in data poor areas to assist with the identification of areas of biological importance; and 3) density data collection. Funding of this research will ensure compliance with the settlement agreement and will ensure that SURTASS training, testing and operational activities are able to proceed without interruption.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** MARINE MAMMAL SETTLEMENT | 0.000 | 3.000 | 3.000 | 0.000 | 3.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Work in FY2018 will be focused on overall planning, getting the Inter-agency Agreement (IAA) set up with NOAA, and setting up funding for all associated partners. The majority of work conducted in FY2018 will be prioritized under topic areas 1) "Developing capacity to protect acoustic habitats, including in national marine sanctuaries managed under the National Marine Sanctuaries Act 16 U.S.C. 1431 et seq., and high-risk areas for protected species" and 2) "Improving marine mammal density and distribution modeling in data-poor areas".<br><br>Work under topic area 1 will be focused on finalizing soundscape monitoring plans, holding a soundscape workshop with international experts, purchasing equipment, and preparing for fieldwork in FY2019. Work under | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603721N / *Environmental Protection* | **Project (Number/Name)**<br>9205 / *Marine Mammal Settlement* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| topic area 2 will be focused on holding a workshop and collaborating with the workgroup experts on priority research areas to advance density spatial modeling methods among federal agencies.<br>***FY 2019 Base Plans:***<br>Work in FY2019 under topic area 1 will be focused on conducting soundscape monitoring and fieldwork within National Marine Sanctuaries on the East Coast, West Coast, and Hawaii. This will include deployment and maintenance of passive acoustic monitoring equipment, gliders, telemetry stations; organization and communication regarding analysis techniques; and potentially some initial analysis of data collected.<br><br>Work under topic area 2 will be focused on holding a follow-up workshop and continuing to collaborate with the workgroup experts on priority research areas to advance density spatial modeling methods among federal agencies.<br><br>Work under topic area 3 will include planning for what experts will be included in the workgroup and for the elicitation process that will occur in FY2020.<br>***FY 2019 OCO Plans:***<br>N/A | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 3.000 | 3.000 | 0.000 | 3.000 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

RDTEN Contracts are Competitive Procurements.

**E. Performance Metrics**

Quarterly Program Reviews

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603721N / *Environmental Protection* | Project (Number/Name)<br>9205 / *Marine Mammal Settlement* | |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SURTASS | MIPR | NOAA, HQ : Silver Spring, MD | 0.000 | 0.000 | | 2.500 | Oct 2017 | 2.500 | Oct 2018 | - | | 2.500 | 0.000 | 5.000 | - |
| SURTASS | WR | EXWC : Port Hueneme, CA | 0.000 | 0.000 | | 0.500 | Oct 2017 | 0.500 | Oct 2018 | - | | 0.500 | 0.000 | 1.000 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 3.000 | | 3.000 | | - | | 3.000 | 0.000 | 6.000 | N/A |

**Remarks**

Annual funding in the amount of $3M are required to comply with the settlement. Funding will likely be disbursed as indicated below and all monies are required in the 1st Quarter of the Fiscal Year (Oct 1 2017).

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 3.000 | | 3.000 | | - | | 3.000 | 0.000 | 6.000 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603721N / *Environmental Protection* | **Project (Number/Name)**<br>9205 / *Marine Mammal Settlement* |

| | FY 2017 | | | | FY 2018 | | | | FY 2019 | | | | FY 2020 | | | | FY 2021 | | | | FY 2022 | | | | FY 2023 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| ***Proj 9205*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SURTASS Marine Mammal Settlement:<br>SURTASS Marine Mammal Settlement | | | | | [redacted] | | | | | | | | | | | | | | | | | | | | | | | |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603721N / *Environmental Protection* | **Project (Number/Name)**<br>9205 / *Marine Mammal Settlement* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 9205*** | | | | |
| SURTASS Marine Mammal Settlement: SURTASS Marine Mammal Settlement | 1 | 2018 | 4 | 2020 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603724N *I Navy Energy Program* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 325.796 | 69.500 | 25.623 | 25.656 | - | 25.656 | 26.452 | 26.991 | 27.513 | 28.094 | Continuing | Continuing |
| 0829: *ENERGY CONSERVATION (ADV)* | 67.683 | 9.597 | 5.471 | 5.489 | - | 5.489 | 5.643 | 5.761 | 5.876 | 6.000 | Continuing | Continuing |
| 0838: *Mobility Fuels (ADV)* | 79.053 | 12.774 | 7.928 | 7.921 | - | 7.921 | 8.194 | 8.363 | 8.516 | 8.707 | Continuing | Continuing |
| 0928: *Shore Energy Technology* | 50.252 | 1.957 | 1.800 | 1.704 | - | 1.704 | 1.859 | 1.898 | 1.936 | 1.976 | Continuing | Continuing |
| 0996: *Aircraft Energy Conservation* | 116.739 | 25.829 | 10.424 | 10.542 | - | 10.542 | 10.756 | 10.969 | 11.185 | 11.411 | Continuing | Continuing |
| 9999: *Congressional Adds* | 12.069 | 19.343 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 31.412 |

**A. Mission Description and Budget Item Justification**

This program supports projects to evaluate, adapt, and demonstrate energy related technologies for Navy aircraft and ship operations to: (a) increase fuel-related weapons systems capabilities such as range and time on station; (b) reduce energy costs; (c) apply energy technologies that improve environmental compliance; (d) examine restrictive fuel specification requirements to reduce cost and increase availability worldwide; (e) provide guidance to fleet operators for the safe use of commercial grade or off-specification fuels; and (f) make needed periodic changes to fuel specifications to ensure fuel quality and avoid fleet operating problems. This program supports the achievement of legislated, White House, Department of Defense, and Navy energy management goals.

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under ADVANCED COMPONENT DEVELOPMENT AND PROTOTYPES because it includes all efforts necessary to evaluate integrated technologies, representative models or prototype systems in a high fidelity and realistic operating environment.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 27.479 | 50.623 | 51.385 | - | 51.385 |
| Current President's Budget | 69.500 | 25.623 | 25.656 | - | 25.656 |
| Total Adjustments | 42.021 | -25.000 | -25.729 | - | -25.729 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -1.379 | 0.000 | | | |
| • Program Adjustments | 25.000 | -25.000 | -25.200 | - | -25.200 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -0.529 | - | -0.529 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | Date: February 2018 |
|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | R-1 Program Element (Number/Name)<br>PE 0603724N *I Navy Energy Program* | | | |
| • Congressional Directed Reductions | -1.600 | - | - | - | - |
| Adjustments | | | | | |
| • Congressional Add Adjustments | 20.000 | - | - | - | - |

| Congressional Add Details ($ in Millions, and Includes General Reductions) | FY 2017 | FY 2018 |
|---|---|---|
| **Project:** 9999: *Congressional Adds* | | |
| Congressional Add: *Installation Energy Efficiency Enhancements* | 4.836 | 0.000 |
| Congressional Add: *Program Increase: Renewable Energy Development* | 14.507 | 0.000 |
| Congressional Add Subtotals for Project: 9999 | 19.343 | 0.000 |
| Congressional Add Totals for all Projects | 19.343 | 0.000 |

**Change Summary Explanation**

Schedule:

0838 - Fuel Quality/Develop Operational and Laboratory Techniques was added from 1Q FY18 through 4Q FY22 to improve/reduce cost of Naval tactical fuel quality analysis.

Technical: Not applicable.

The funding decreases in FY 2018 and FY 2019 reflect a shift in Department of the Navy (DoN) priorities and an urgent requirement to address emergent, critical unfunded requirements in FY 2018. The decrease aligns Energy program funding to the previous amounts executed prior to FY 2011.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603724N / *Navy Energy Program* | Project (Number/Name)<br>0829 / *ENERGY CONSERVATION (ADV)* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0829: *ENERGY CONSERVATION (ADV)* | 67.683 | 9.597 | 5.471 | 5.489 | - | 5.489 | 5.643 | 5.761 | 5.876 | 6.000 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

The Energy Conversation Advanced Project is designed to develop and implement energy and maintenance saving improvements into existing Fleet assets. This energy conservation project, managed through NAVSEA 05T, will identify mature potential energy saving areas, by involvement with Fleet representatives, Life-Cycle Managers (LCMs), NAVSEA Technical Warrant Holders, In-Service Engineering Agents (ISEAs), PEOs, TMA/TMI, Industry, and Academia. The project directly supports SECNAV and CNO goals to reduce energy consumption and increase operational capability (i.e., increase time on station). Potential technology target areas will include: Power Generation and Storage systems, Hull Hydrodynamics, Underwater Hull Husbandry, Heating, Ventilation & Air Conditioning (HVAC) Systems, Thermal Management, Main Propulsion Systems, Electrical Systems, Auxiliary Systems, and Energy Monitoring & Assessment. Potential energy saving proposals, Energy Conservation Concepts (ECC), are developed each FY for evaluation by functional category. Based on review of a business case and a technical community review projects are selected for development. Not all proposed ECCs are pursued and changes to planned funding between functional categories or fiscal years can occur based on the technology maturity level, ship schedule changes, or other factors affecting the projected development or testing timeline.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Hull Hydrodynamic Sub Project | 2.270 | 0.000 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** (U) Hull Hydrodynamic Sub Project - This project area will accomplish prototype development, modeling, laboratory and Fleet testing of ship modifications to propellers and/or hull appendages to determine overall mission and cost effectiveness of these improvements. | | | | | |
| ***FY 2018 Plans:***<br>N/A | | | | | |
| ***FY 2019 Base Plans:***<br>N/A | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***Title:*** Heating , Ventilation and Air Conditioning (HVAC) Sub Project | 0.153 | 0.000 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603724N / *Navy Energy Program* | **Project (Number/Name)**<br>0829 / *ENERGY CONSERVATION (ADV)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Description:*** (U) HVAC Sub Project - Project funds will be utilized to accomplish prototype development, land and shipboard testing to determine cost effectiveness of improvements aimed at more efficient climate control of shipboard spaces.<br>***FY 2018 Plans:***<br>N/A<br>***FY 2019 Base Plans:***<br>N/A<br>***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***Title:*** Propulsion Systems Sub Project | 0.723 | 0.000 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** (U) Propulsion Systems Sub Project - Project funds will be utilized to identify requirements and perform land based and shipboard testing of ship propulsion system improvements on Gas Turbine, Steam, and Diesel Engine systems to reduce overall fuel consumption and lower maintenance costs.<br>***FY 2018 Plans:***<br>N/A<br>***FY 2019 Base Plans:***<br>.<br>***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***Title:*** Thermal Management Sub Project | 0.320 | 0.000 | 0.413 | 0.000 | 0.413 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** (U) Thermal Management Sub Project - Project funds will be utilized to identify and evaluate potential uses for Thermal Management techniques designed to reduce overall shipboard heat generation as well as incorporating waste heat recovery techniques to reduce the shipboard electrical demand on HVAC and other systems.<br>***FY 2018 Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603724N / *Navy Energy Program* | **Project (Number/Name)**<br>0829 / *ENERGY CONSERVATION (ADV)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A<br>***FY 2019 Base Plans:***<br>Continue exploration of waste heat technologies and methods for shipboard application. Provide report of findings with recommendations. Continue to identify additional energy saving/capability improvement technologies in Thermal Management that may be applicable to navy ships. Prepare proposals and business case analyses for promising technologies with potential to reduce fossil fuel consumption.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>The funding increase supports investigating new waste heat technologies for in-service and future combatants. | | | | | |
| ***Title:*** Power Generation and Storage Sub Project<br>***Articles:***<br>***Description:*** Power Generation & Storage System Sub Project - This project area will accomplish prototype development, laboratory and Fleet testing to determine overall effectiveness of technologies focused on improving efficiency of current power generation & storage methodologies.<br>***FY 2018 Plans:***<br>N/A<br>***FY 2019 Base Plans:***<br>N/A<br>***FY 2019 OCO Plans:***<br>N/A | 0.200<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- |
| ***Title:*** Electrical Systems Sub Project<br>***Articles:***<br>***Description:*** (U) Electrical Systems Sub Project - Project funds will be utilized to identify and perform land based and shipboard testing of ship electrical system improvements to reduce energy.<br>***FY 2018 Plans:***<br>N/A<br>***FY 2019 Base Plans:*** | 0.412<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603724N / *Navy Energy Program* | **Project (Number/Name)**<br>0829 / *ENERGY CONSERVATION (ADV)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A<br>***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***Title:*** Energy Monitoring & Assessment | 5.519 | 5.471 | 5.076 | 0.000 | 5.076 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** This project area will focus on methods of capturing and displaying energy related data to shipboard personnel as actionable information for ships force to employ energy conservation measures underway and in port as mission requirements permit.<br><br>***FY 2018 Plans:***<br>Provide engineering, technical and programmatic support of energy initiatives that put in place shore and shipboard monitoring and assessment tools aimed at optimizing ships' energy profiles and increasing operational capabilities. Continue Global Energy Information System (GENISYS) development efforts, hosting and shipboard evaluation of Fleet Energy Conversation Dashboard (FECD), Vessel Utilization Tool (VFUT), Shipboard energy Assessment System (SEAS), and eLogBooks to support future fleet-wide implementation including integration of enterprise Remote Monitoring (eRM) capabilities to support future fleet-wide implementation. Based on successful evaluation of TRITON prototype installation complete qualification testing of equipment for fleet wide implementation.<br><br>***FY 2019 Base Plans:***<br>Provide engineering, technical and programmatic support of energy initiatives that put in place shore and shipboard monitoring and assessment tools aimed at optimizing ships' energy profiles and increasing operational capabilities. Continue GENISYS development efforts and shipboard evaluation including integration of GENISYS with enterprise Remote Monitoring (eRM) capabilities to support future fleet-wide implementation. Continue to identify additional energy saving/capability improvement technologies and monitoring methodologies and prepare proposals and business case analyses for promising technologies with potential to reduce fossil fuel.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No significant change from FY 2018 to FY 2019. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 9.597 | 5.471 | 5.489 | 0.000 | 5.489 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603724N / *Navy Energy Program* | **Project (Number/Name)**<br>0829 / *ENERGY CONSERVATION (ADV)* |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

RDT&E Contracts are Competitive Procurements.

**E. Performance Metrics**

Quarterly Program Reviews

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603724N / *Navy Energy Program* | Project (Number/Name)<br>0829 / *ENERGY CONSERVATION (ADV)* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Systems Engineering | C/CPFF | NAVSEA HQ : Washington, DC | 0.000 | 0.000 | | 1.110 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 1.110 | - |
| Systems Engineering | WR | NSWC DD : Dahlgren, MD | 0.000 | 0.100 | Nov 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.100 | - |
| Systems Engineering | WR | NSWC PHila : Philadelphia, PA | 0.821 | 0.834 | Nov 2016 | 0.175 | Nov 2017 | 0.328 | Nov 2018 | - | | 0.328 | 0.000 | 2.158 | - |
| Primary Hardware Development | WR | NSWC Carderock : Bethesda, MD | 8.983 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 8.983 | - |
| Systems Engineering | WR | NSWC PHD : Port Hueneme, CA | 0.000 | 0.100 | Nov 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.100 | - |
| Systems Engineering | C/CPAF | NSWC Carderock : Bethesda, MD | 6.635 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 6.635 | - |
| Engineering Development | WR | NSWC Carderock : Bethesda, MD | 7.848 | 0.521 | Nov 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 8.369 | - |
| Demonstration & Evaluation | WR | NSWC Carderock : Bethesda, MD | 8.149 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 8.149 | - |
| System Development | C/BOA | NAWC-AD : Lakehurst, NJ | 0.000 | 1.300 | Jan 2017 | 1.286 | Jan 2018 | 2.169 | Jan 2019 | - | | 2.169 | 0.000 | 4.755 | - |
| Primary Hardware Development | C/CPAF | NSWC PHila : Philadelphia, PA | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | - |
| | | **Subtotal** | 32.436 | 2.855 | | 2.571 | | 2.497 | | - | | 2.497 | 0.000 | 40.359 | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Development Support | WR | NSWC Carderock : Bethesda, MD | 2.843 | 0.000 | | 0.000 | Jan 2018 | 0.344 | Nov 2018 | - | | 0.344 | Continuing | Continuing | Continuing |
| Software Support | WR | NSWC Carderock : Bethesda, MD | 0.522 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Integrated Logistics Support | WR | NSWC Carderock : Bethesda, MD | 1.200 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603724N / *Navy Energy Program* | Project (Number/Name)<br>0829 / *ENERGY CONSERVATION (ADV)* | |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Study Anaylsis | WR | NSWC Carderock : Bethesda, MD | 1.174 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Development Support | C/CPAF | NSWC SSES : Philadelphia, PA | 0.878 | 0.000 | | 0.000 | | 0.100 | Jan 2019 | - | | 0.100 | 0.000 | 0.978 | - |
| Development Support | C/CPFF | NAVSEA HQ : Washington, DC | 0.100 | 0.149 | Oct 2017 | 0.601 | Feb 2018 | 0.479 | Jan 2019 | - | | 0.479 | 0.000 | 1.329 | - |
| Software Support | C/CPAF | NSWC SSES : Philadelphia, PA | 0.281 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.281 | - |
| Software Support | C/CPAF | NAVSEA HQ : Washington, DC | 1.200 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.200 | - |
| Development Support | WR | NSWC PHila : Philadelphia, PA | 0.000 | 2.146 | Nov 2016 | 0.125 | Dec 2017 | 0.494 | Nov 2018 | - | | 0.494 | 0.000 | 2.765 | - |
| Development Support | C/CPAF | SUPSHIP : Bath, MA | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | - |
| | | **Subtotal** | 8.198 | 2.295 | | 0.726 | | 1.417 | | - | | 1.417 | Continuing | Continuing | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Developmental Test & Evaluation | WR | NSWC Carderock : Bethesda, MD | 9.961 | 0.000 | | 0.000 | | 0.085 | Dec 2018 | - | | 0.085 | Continuing | Continuing | Continuing |
| Operational Test & Evaluation | WR | NSWC Carderock : Bethesda, MD | 8.375 | 2.270 | Nov 2016 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| LIve Fire Test & Evaluation | WR | NSWC Carderock : Bethesda, MD | 0.382 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.382 | - |
| Developmental Test & Evaluation | C/CPAF | NSWC Philadelphia : Philadelphia, PA | 0.383 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.383 | - |
| Developmental Test & Evaluation | WR | NSWC SSES : Philadelphia, PA | 0.000 | 0.549 | Nov 2016 | 0.369 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.918 | - |
| Developmental Test & Evaluation | WR | APL : Washington, DC | 0.000 | 0.000 | | 0.000 | | 0.085 | Jan 2019 | - | | 0.085 | 0.000 | 0.085 | - |
| | | **Subtotal** | 19.101 | 2.819 | | 0.369 | | 0.170 | | - | | 0.170 | Continuing | Continuing | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603724N / *Navy Energy Program* | Project (Number/Name)<br>0829 / *ENERGY CONSERVATION (ADV)* |

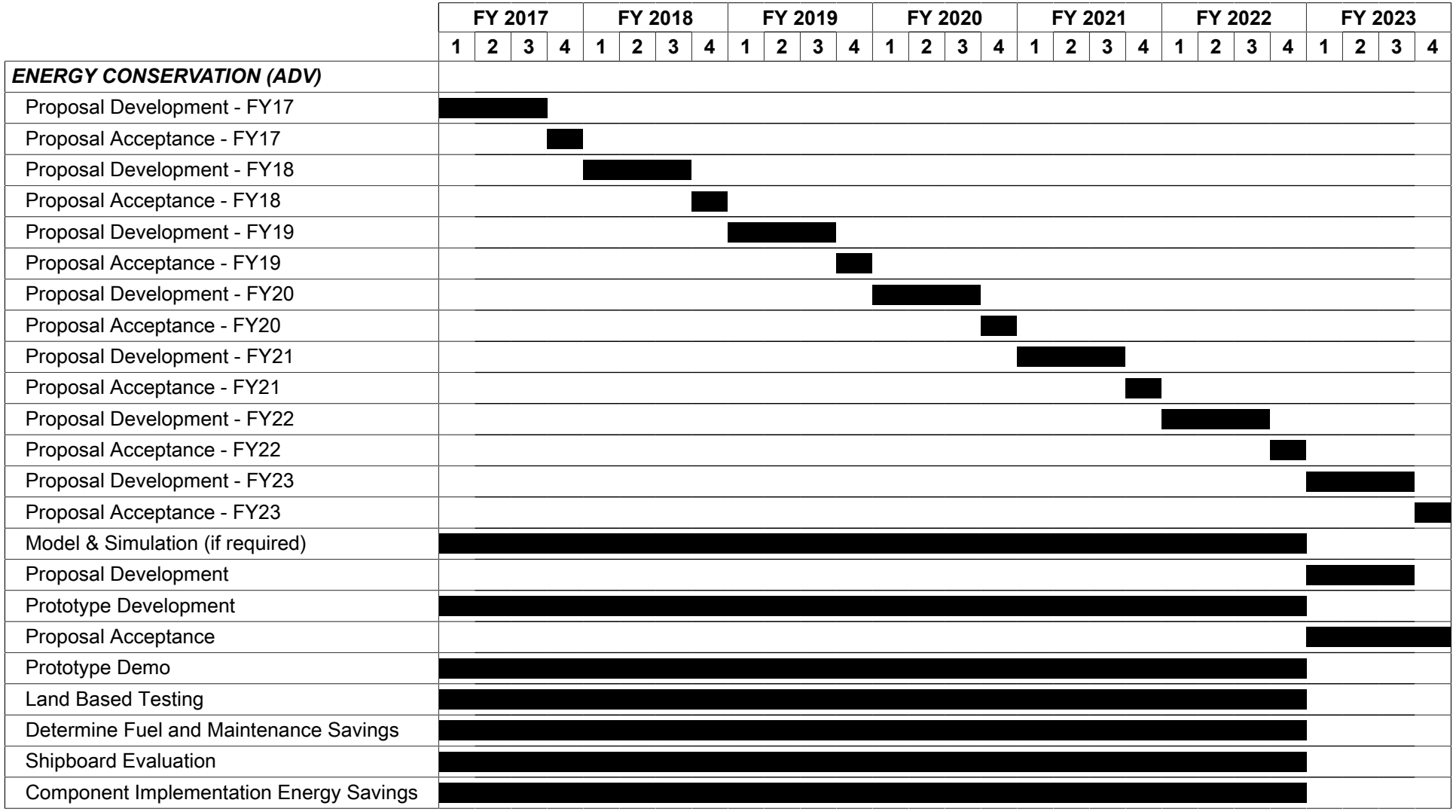
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management Support | WR | NSWC Philadelphia : Philadelphia, PA | 6.180 | 0.500 | Nov 2016 | 0.622 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 7.302 | - |
| Travel | Allot | NAVSEA HQ : Washington, DC | 0.176 | 0.013 | Nov 2016 | 0.013 | Dec 2017 | 0.007 | Dec 2018 | - | | 0.007 | 0.000 | 0.209 | - |
| Total Assets | WR | NSWC Carderock : Bethesda, MD | 0.352 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.352 | - |
| Program Management Support | C/CPFF | NAVSEA HQ : Washington, DC | 0.890 | 0.790 | Jan 2017 | 0.813 | Jan 2018 | 1.378 | Jan 2019 | - | | 1.378 | 0.000 | 3.871 | - |
| Program Management Support | WR | NSWC Carderock : Bethesda, MD | 0.350 | 0.325 | Nov 2016 | 0.357 | Nov 2017 | 0.020 | Mar 2019 | - | | 0.020 | 0.000 | 1.052 | - |
| | | **Subtotal** | 7.948 | 1.628 | | 1.805 | | 1.405 | | - | | 1.405 | 0.000 | 12.786 | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 67.683 | 9.597 | | 5.471 | | 5.489 | | - | | 5.489 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603724N / *Navy Energy Program* | **Project (Number/Name)**<br>0829 / *ENERGY CONSERVATION (ADV)* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603724N / *Navy Energy Program* | **Project (Number/Name)**<br>0829 / *ENERGY CONSERVATION (ADV)* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***ENERGY CONSERVATION (ADV)*** | | | | |
| Proposal Development - FY17 | 1 | 2017 | 3 | 2017 |
| Proposal Acceptance - FY17 | 4 | 2017 | 4 | 2017 |
| Proposal Development - FY18 | 1 | 2018 | 3 | 2018 |
| Proposal Acceptance - FY18 | 4 | 2018 | 4 | 2018 |
| Proposal Development - FY19 | 1 | 2019 | 3 | 2019 |
| Proposal Acceptance - FY19 | 4 | 2019 | 4 | 2019 |
| Proposal Development - FY20 | 1 | 2020 | 3 | 2020 |
| Proposal Acceptance - FY20 | 4 | 2020 | 4 | 2020 |
| Proposal Development - FY21 | 1 | 2021 | 3 | 2021 |
| Proposal Acceptance - FY21 | 4 | 2021 | 4 | 2021 |
| Proposal Development - FY22 | 1 | 2022 | 3 | 2022 |
| Proposal Acceptance - FY22 | 4 | 2022 | 4 | 2022 |
| Proposal Development - FY23 | 1 | 2023 | 3 | 2023 |
| Proposal Acceptance - FY23 | 4 | 2023 | 4 | 2023 |
| Model & Simulation (if required) | 1 | 2017 | 4 | 2022 |
| Proposal Development | 1 | 2023 | 3 | 2023 |
| Prototype Development | 1 | 2017 | 4 | 2022 |
| Proposal Acceptance | 1 | 2023 | 4 | 2023 |
| Prototype Demo | 1 | 2017 | 4 | 2022 |
| Land Based Testing | 1 | 2017 | 4 | 2022 |
| Determine Fuel and Maintenance Savings | 1 | 2017 | 4 | 2022 |
| Shipboard Evaluation | 1 | 2017 | 4 | 2022 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603724N / *Navy Energy Program* | **Project (Number/Name)**<br>0829 / *ENERGY CONSERVATION (ADV)* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Component Implementation Energy Savings | 1 | 2017 | 4 | 2022 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603724N / *Navy Energy Program* | Project (Number/Name)<br>0838 / *Mobility Fuels (ADV)* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0838: *Mobility Fuels (ADV)* | 79.053 | 12.774 | 7.928 | 7.921 | - | 7.921 | 8.194 | 8.363 | 8.516 | 8.707 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

This project provides data through laboratory, component, engine, fuel system, and weapon system tests, which relate the effects of changes in the Navy fuel procurement specification properties and chemistries to the performance and reliability of Naval ship, aircraft, and fuel distribution systems. The information is required to: (a) assure interoperability with fuel procured from commercial specifications, (b) determine the extent to which unnecessarily restrictive specification features can be relaxed to reduce cost and increase availability worldwide, (c) provide guidance to fleet operators for the safe use of off-specification fuels or emerging CONOPS requiring the use of non-traditional fuels,(d) technically justify changes to fuel specifications to ensure fuel quality and avoid fleet operating problems while accommodating evolutionary changes in fuel supply, and (e) improve capability to provide fuel quality surveillance in the field and (f) facilitate rapid identification and resolution of field identified fuel deficiencies. Continued volatility and rapid escalation of the cost of fuel have placed additional pressures on Navy budgets responsible for maintaining and sustaining the Navy tactical fleet both now and in the future. These pressures have placed an added emphasis on the potential use of lower cost commercial fuels and/or fuels derived from non-petroleum sources as a potential means of stabilizing the current and anticipated price volatility. Recent problems with petroleum-based fuel quality have demonstrated the adverse effects that fuel-related problems can have on ship and aircraft system performance, reliability, and readiness. The program addresses readiness, additional maintenance costs, and the cost of lost equipment. The potential risk of fuel-related problems over the next decade, given the unknown supply, feedstocks, and the introduction of new theaters of operation, will continue to increase.

This project represents the Navy's only investment designed to maintain its capability to operate as a "smart" customer for fuels that cost over $4.0 billion per year for procurement, transport, storage, and consumption, and are essential to fleet operations.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Naval Tactical Fuels | 12.774 | 7.928 | 7.921 | 0.000 | 7.921 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Perform development, test and evaluation work on Naval tactical fuels to: a) assure interoperability with commercial fuel specifications, b) determine the extent to which unnecessarily restrictive specification features can be relaxed to reduce cost and increase availability worldwide; c) provide guidance to fleet operators for the safe use of off-specification or non-primary fuels , d) validate periodic changes to the Navy tactical fuel specifications to ensure fuel quality and avoid fleet operating problems while accommodating evolutionary changes in the fuel supply industry and e) improve fleet methods to ensure fuel quality. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603724N / *Navy Energy Program* | **Project (Number/Name)**<br>0838 / *Mobility Fuels (ADV)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***FY 2018 Plans:***<br>Conduct testing to assure interoperability with commercial fuel specifications. Conduct research, development, test, and evaluation to mitigate field-identified aviation and ship propulsion fuel deficiencies. Conduct research, development, test, and evaluation to improve/reduce cost of Naval tactical fuel quality surveillance and analysis.<br>***FY 2019 Base Plans:***<br>Conduct rig and component tests to assure interoperability with changing worldwide commercial aviation fuel specifications. Continue development of analytical tools to facilite rapid mitigation of field-identified aviation and ship propulsion fuel deficiencies. Continue development data analytic techniques to rapidly evaluate fuel chemical<br>composition, performance and field databases. Field trial advance fuel quality surveillance tools .<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No significant change from FY 2018 to FY 2019. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 12.774 | 7.928 | 7.921 | 0.000 | 7.921 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Testing efforts will be competitively contracted, and performed under Cost Plus Fixed Fee and Firm Fixed Price contracts.

**E. Performance Metrics**

Program will assess changes and develop data, test methods and hardware performance analysis for all Naval aircraft and ships. Program will evaluate fuel chemistry and properties and develop technologies to identify and assess impact of differences.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603724N / *Navy Energy Program* | Project (Number/Name)<br>0838 / *Mobility Fuels (ADV)* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Systems Engineering | WR | NRL : Washington, D.C. | 4.202 | 0.850 | Nov 2016 | 1.100 | Dec 2017 | 0.800 | Dec 2018 | - | | 0.800 | Continuing | Continuing | Continuing |
| Systems Engineering | WR | NAWCAD : Patuxent River, MD | 14.418 | 2.400 | Nov 2016 | 2.297 | Dec 2017 | 2.046 | Dec 2018 | - | | 2.046 | Continuing | Continuing | Continuing |
| Systems Engineering | WR | NSWC : Philadelphia, PA | 3.508 | 0.270 | Jan 2017 | 0.150 | Jan 2018 | 0.500 | Jan 2019 | - | | 0.500 | Continuing | Continuing | Continuing |
| Systems Engineering | WR | NSWC : Bethesda, MD | 0.312 | 0.000 | | 0.050 | Feb 2018 | 0.100 | Mar 2019 | - | | 0.100 | Continuing | Continuing | Continuing |
| Systems Engineering | C/FFP | Various : Various | 0.000 | 0.960 | Mar 2017 | 1.269 | Mar 2018 | 0.652 | Apr 2019 | - | | 0.652 | 0.000 | 2.881 | 2.881 |
| Prior year Prod Dev no longer funded in the FYDP | Various | Various : Various | 0.161 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.161 | - |
| | | **Subtotal** | 22.601 | 4.480 | | 4.866 | | 4.098 | | - | | 4.098 | Continuing | Continuing | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Test Fuel | C/FFP | Various : Various | 2.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.000 | 2.000 |
| Test Fuel | C/FFP | Applied Research Associates : Albuquerque, NM | 3.858 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.858 | 3.858 |
| Hardware Testing | WR | NAWCAD : Patuxent River, MD | 4.349 | 0.100 | Nov 2016 | 0.200 | Dec 2017 | 0.200 | Dec 2018 | - | | 0.200 | Continuing | Continuing | Continuing |
| Hardware Testing | C/CPFF | Life Cycle Engineering : Charleston, SC | 10.030 | 2.950 | Apr 2017 | 2.000 | Dec 2017 | 1.943 | Apr 2019 | - | | 1.943 | 0.000 | 16.923 | 16.923 |
| Hardware Testing | SS/CPFF | Rolls Royce : Indianapolis, IN | 2.912 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.912 | 2.912 |
| Hardware Testing | C/CPFF | Univ of Dayton Research Inst : Dayton, OH | 0.689 | 0.200 | Apr 2017 | 0.000 | | 0.400 | Feb 2019 | - | | 0.400 | 0.000 | 1.289 | 1.289 |
| Hardware Testing | WR | US Naval Academy : Annapolis, MD | 0.098 | 0.000 | | 0.050 | May 2018 | 0.050 | Apr 2019 | - | | 0.050 | 0.000 | 0.198 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603724N / *Navy Energy Program* | Project (Number/Name)<br>0838 / *Mobility Fuels (ADV)* | |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hardware Testing | C/CPFF | General Electric : Lynn, MA | 1.237 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.237 | 1.237 |
| Hardware Testing | WR | NSWC : Philadelphia, PA | 0.080 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.080 | - |
| Hardware Testing | C/FFP | Various : Various | 1.509 | 4.674 | Sep 2017 | 0.500 | Jan 2018 | 0.920 | Feb 2019 | - | | 0.920 | 0.000 | 7.603 | 7.603 |
| Hardware Testing | WR | NSWC : Port Hueneme, CA | 0.200 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.200 | - |
| Hardware Testing | C/CPFF | DL Mgmt Services JT Venture : Plainfield, IL | 0.004 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.004 | 0.004 |
| Fuel Delivery | MIPR | DLA-Energy : Ft. Belvoir, VA | 0.497 | 0.150 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.647 | - |
| Fuel Blend Testing | WR | Naval Medical Research Unit : Dayton, OH | 0.042 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.042 | - |
| Prior year T & E no longer funded in the FYDP | Various | Various : Various | 21.212 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 21.212 | - |
| | | **Subtotal** | 48.717 | 8.074 | | 2.750 | | 3.513 | | - | | 3.513 | Continuing | Continuing | N/A |

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management Support | WR | NAWCAD : Patuxent River, MD | 1.088 | 0.203 | May 2017 | 0.300 | Dec 2017 | 0.300 | Dec 2018 | - | | 0.300 | Continuing | Continuing | Continuing |
| Program Management Support | WR | NAVSUP : San Diego, CA | 0.022 | 0.005 | Nov 2017 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Program Management Support | C/FFP | Coord Research Council : Alpharetta, GA | 0.040 | 0.010 | Dec 2017 | 0.010 | Nov 2017 | 0.010 | Nov 2018 | - | | 0.010 | 0.000 | 0.070 | 0.070 |
| Program Management Support | WR | NAVSEA : Washington, DC | 0.002 | 0.002 | Apr 2017 | 0.002 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.006 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603724N / *Navy Energy Program* | Project (Number/Name)<br>0838 / *Mobility Fuels (ADV)* | |

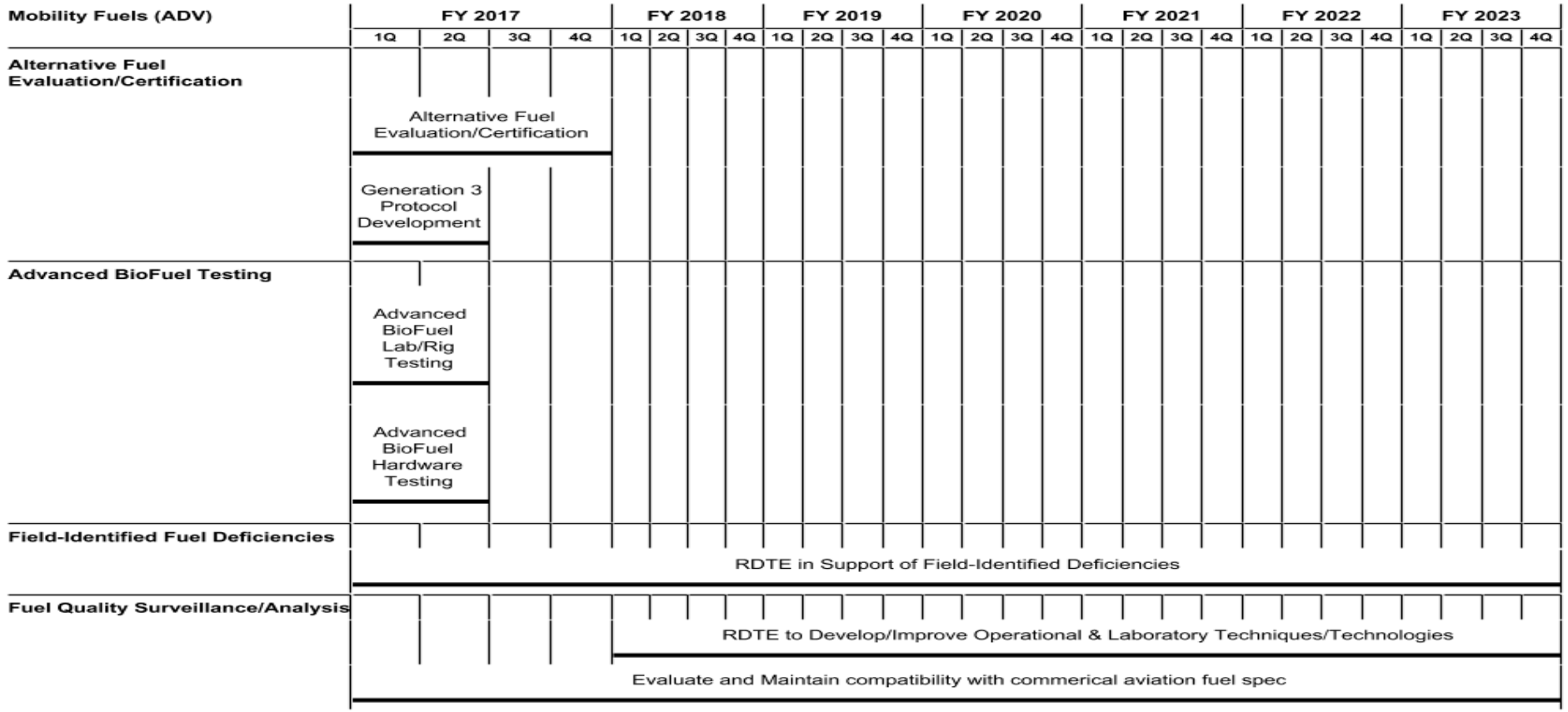
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Prior year Mgmt Supp no longer funded in the FYDP | Various | Various : Various | 6.583 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 6.583 | - |
| | | **Subtotal** | 7.735 | 0.220 | | 0.312 | | 0.310 | | - | | 0.310 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 79.053 | 12.774 | | 7.928 | | 7.921 | | - | | 7.921 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603724N / *Navy Energy Program* | **Project (Number/Name)**<br>0838 / *Mobility Fuels (ADV)* |




*2019DON - 0603724N - 0838*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603724N / *Navy Energy Program* | **Project (Number/Name)**<br>0838 / *Mobility Fuels (ADV)* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Mobility Fuels (ADV)*** | | | | |
| Alternative Fuel Evaluation/Certification: Alternative Fuel Evaluation/Certification | 1 | 2017 | 4 | 2017 |
| Alternative Fuel Evaluation/Certification: Generation 3 Protocol Development | 1 | 2017 | 2 | 2017 |
| Advanced BioFuel Testing: Advanced BioFuel Lab/Rig Testing | 1 | 2017 | 2 | 2017 |
| Advanced BioFuel Testing: Advanced BioFuel Hardware Testing | 1 | 2017 | 2 | 2017 |
| Field-Identified Fuel Deficiencies: RDTE in Support of Field-Identified Fuel Deficiencies | 1 | 2017 | 4 | 2023 |
| Fuel Quality Surveillance/Analysis: RDTE to Develop/Improve Operational & Laboratory Techniques/Technologies | 1 | 2018 | 4 | 2023 |
| Fuel Quality Surveillance/Analysis: Evaluate and Maintain compatibility with commerical aviation fuel spec | 1 | 2017 | 4 | 2023 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603724N / *Navy Energy Program* | Project (Number/Name)<br>0928 / *Shore Energy Technology* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0928: *Shore Energy Technology* | 50.252 | 1.957 | 1.800 | 1.704 | - | 1.704 | 1.859 | 1.898 | 1.936 | 1.976 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Legislation, Executive Orders (EO), and SECNAV Guidance direct DoN to reduce fossil fuel use and increase energy resiliency through efficiency, reliability, and alternative energy sources. This guidance includes the National Defense Authorization Act of 2010, which directs DOD to source 25% of its energy from renewable sources by 2025, EO13514, which directs DOD to reduce greenhouse gas emissions by 2020, and SECNAV energy goals, which direct that 50% of DoN's energy come from alternative sources by 2020. Further, studies by the Defense Science Board and others have stressed the dangerous reliance of DOD on vulnerable grid power and unreliable imported oil.

This Energy RDT&E Project will test, evaluate, and validate components as well as demonstrate cost-effective and technical viability of energy security and efficiency, and technologies. All efforts will be coordinated across DOD and with other agencies as appropriate. Specifically, this project aims to pursue three areas of development, testing and evaluation: (A) Modeling and possible prototype testing of new energy sources for use at Naval installations with potential for widespread applicability to energy security; (B) It will support demonstration and validation of advanced electric grid management systems, known as "Smart Grid" and "Micro Grid" technology, for use at Naval installations to enable improved energy security; (C) Demonstration and Validation of Alternative Energy, Energy Efficiency, and Smart Energy Management Technology: This project will support the testing, demonstration, validation, and application of innovative facility energy efficiency and alternative energy technology.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Shore Energy Technology | 1.957 | 1.800 | 1.704 | 0.000 | 1.704 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>- Continue demonstration, testing, and evaluation of improved and low cost smart and micro grid energy management technologies.<br>- Complete microgrid test bed. Install microgrid components and control system. Commission system.<br>- Continue demonstration of energy security cyber secure technologies.<br>- Test, validate and demonstration wireless lighting control system in closed environment in order to gain certification for widespread implementation.<br>- Demonstrate energy efficient Containerized Living Units (CLU). Test CLU in operational environment in order to implement energy efficient living quarters for forward environments.<br>- Complete diesel uninterruptable power supply flywheel study to determine applicability and viability of technology for energy resilient microgrid systems. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603724N / *Navy Energy Program* | **Project (Number/Name)**<br>0928 / *Shore Energy Technology* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| -Installation, demonstration and validating of energy efficient wastewater treatment on mobile and stationary facilities to save energy and water.<br>-Demonstration and validation of cyber security technologies for energy controls systems in a controlled test environment to enable a cybersecure environment.<br>***FY 2019 Base Plans:***<br>- Continue demonstration, testing, and evaluation of improved and low cost smart and microgrid energy management<br>technologies to enable energy security.<br>- Continue demonstration of cyber secure technologies utilizing cyber testbed.<br>- Test, validate and demonstrate wireless controls. Obtain Risk Management Framework certification, install, and test in operational environment.<br>- Installation and demonstration of energy efficient wastewater treatment of both mobile and stationary facilities to save energy and water. Test systems in operational environment.<br>- Demonstration and validation of cyber security technologies for energy controls systems in an operational environment to enable a cyber secure environment.<br>- Initiate new projects in energy resiliency including cyber security of energy controls systems.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No significant changes in from FY 2018 to FY 2019. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 1.957 | 1.800 | 1.704 | 0.000 | 1.704 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Demonstration and validation are conducted for maximum transfer and interaction with industry such as to influence the industry COTS with the results of this demonstration and prototype validation. Acquisition is based on performance specifications enabled by this project.

**E. Performance Metrics**

The program will be coordinated across DOD and with other agencies as appropriate.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603724N / *Navy Energy Program* | Project (Number/Name)<br>0928 / *Shore Energy Technology* |

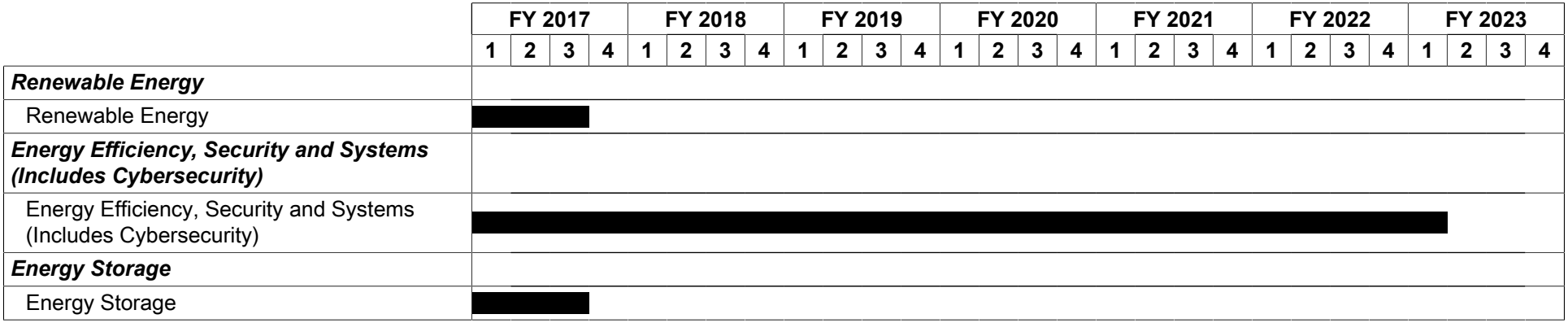
**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Renewable Energy | Various | EXWC : Port Hueneme, CA | 42.028 | 0.232 | Oct 2016 | 0.000 | Dec 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Energy Efficiency, Security and Systems (Includes cybersecurity) | Various | EXWC : Port Hueneme, CA | 4.122 | 0.505 | Oct 2016 | 1.800 | Oct 2017 | 1.704 | Oct 2018 | - | | 1.704 | Continuing | Continuing | Continuing |
| Energy Storage | Various | EXWC : Port Hueneme, CA | 4.102 | 1.220 | Oct 2016 | 0.000 | Dec 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 50.252 | 1.957 | | 1.800 | | 1.704 | | - | | 1.704 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 50.252 | 1.957 | | 1.800 | | 1.704 | | - | | 1.704 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603724N / *Navy Energy Program* | **Project (Number/Name)**<br>0928 / *Shore Energy Technology* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603724N / *Navy Energy Program* | **Project (Number/Name)**<br>0928 / *Shore Energy Technology* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Renewable Energy*** | | | | |
| Renewable Energy | 1 | 2017 | 3 | 2017 |
| ***Energy Efficiency, Security and Systems (Includes Cybersecurity)*** | | | | |
| Energy Efficiency, Security and Systems (Includes Cybersecurity) | 1 | 2017 | 1 | 2023 |
| ***Energy Storage*** | | | | |
| Energy Storage | 1 | 2017 | 3 | 2017 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603724N / *Navy Energy Program* | Project (Number/Name)<br>0996 / *Aircraft Energy Conservation* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0996: *Aircraft Energy Conservation* | 116.739 | 25.829 | 10.424 | 10.542 | - | 10.542 | 10.756 | 10.969 | 11.185 | 11.411 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The Aircraft Energy Conservation (AIR-ENCON) program is designed to develop and implement energy and maintenance saving improvements into existing fleet assets. The program identifies, evaluates, and implements energy savings initiatives for potential implementation into Naval aircraft. The objective of the program is to engage technical experts from across Naval aviation, industry, and academia to identify mature potential energy saving opportunities and determine the technical and fiscal viability of implementing them in existing aircraft platforms to enable significant improvement in mission capability.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Aircraft Energy Conservation | 25.829 | 10.424 | 10.542 | 0.000 | 10.542 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Continue identification, validation, and implementation of energy conservation/efficiency concepts. Identify, develop and validate of fleet best practices, metrics and energy dashboards. Continue validation of an advanced algorithm to optimize the trim/reduce the drag of the F-18 during flight. Continue evaluation of engine technology to improve efficiency of the MQ-8C and F-18. | | | | | |
| ***FY 2019 Base Plans:***<br>Continue identification, validation and implementation of energy conservation/efficiency concepts, best practices and<br>metrics. Field aviation energy fleet dashboard. Initiate fielding of algorithm to optimize trim/reduce drag of F-18 during flight. Continue evaluation of engine technology to improve efficiency of MQ-8C and F-18. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>The $118K increase will accelerate completion of engine efficiency technology study. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 25.829 | 10.424 | 10.542 | 0.000 | 10.542 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603724N / *Navy Energy Program* | **Project (Number/Name)**<br>0996 / *Aircraft Energy Conservation* |

**C. Other Program Funding Summary ($ in Millions)**

**Remarks**

**D. Acquisition Strategy**

This is a non-acquisition program that develops, evaluates, and validates mature technologies in support of increased missioned capability and fleet fuel maintenance savings.

**E. Performance Metrics**

Actual performance of energy conservation initiatives are measured against initially projected fuel savings measured in barrels of fuel saved based on aircraft demonstration testing.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603724N / *Navy Energy Program* | Project (Number/Name)<br>0996 / *Aircraft Energy Conservation* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Systems Engineering | WR | NAWCAD : Patuxent River, MD | 4.690 | 0.955 | Nov 2016 | 1.724 | Nov 2017 | 1.917 | Dec 2018 | - | | 1.917 | Continuing | Continuing | Continuing |
| Systems Engineering | C/CPFF | Lockheed Martin : Fort Worth, TX | 0.684 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.684 | 0.684 |
| Systems Engineering | C/FFP | The Boeing Co. : St. Louis, MO | 0.400 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.400 | 0.400 |
| Systems Engineering | C/CPFF | TBD : TBD | 0.064 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.064 | 0.064 |
| Systems Engineering | C/CPFF | The Boeing Company : Seattle, WA | 0.000 | 1.150 | Jan 2017 | 0.000 | | 0.600 | Jan 2019 | - | | 0.600 | 0.000 | 1.750 | 1.750 |
| Systems Engineering | C/CPFF | Various : Various | 0.000 | 3.669 | Jan 2017 | 7.150 | Mar 2018 | 5.425 | Mar 2019 | - | | 5.425 | 0.000 | 16.244 | 16.244 |
| Prior year Sys Eng no longer funded in the FYDP | Various | Various : Various | 2.464 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.464 | - |
| Systems Engineering | C/BA | Deloitte Consulting : Alexandria, VA | 0.000 | 0.700 | Jul 2017 | 0.900 | Jan 2018 | 1.200 | Apr 2019 | - | | 1.200 | 0.000 | 2.800 | 2.800 |
| | | **Subtotal** | 8.302 | 6.474 | | 9.774 | | 9.142 | | - | | 9.142 | Continuing | Continuing | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hardware Testing | C/CPFF | PWA : Hartford, CT | 95.711 | 4.140 | Oct 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 99.851 | 99.851 |
| Hardware Testing | WR | NAWCAD : Patuxent River, MD | 2.185 | 2.400 | Nov 2016 | 0.300 | Jan 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Hardware Testing | C/CPFF | Lockheed : Fort Worth, TX | 3.134 | 12.540 | Sep 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 15.674 | 15.674 |
| Prior year T&E no longer funded in the FYDP | Various | Various : Various | 0.100 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.100 | - |
| Test and Evaluation | C/CPFF | The Boeing Company : Seattle, WA | 1.500 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.500 | 1.500 |
| Hadware Testing | C/CPFF | Various : Various | 0.000 | 0.000 | | 0.000 | | 1.000 | Mar 2019 | - | | 1.000 | 0.000 | 1.000 | 1.000 |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603724N / *Navy Energy Program* | Project (Number/Name)<br>0996 / *Aircraft Energy Conservation* | |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Subtotal** | 102.630 | 19.080 | | 0.300 | | 1.000 | | - | | 1.000 | Continuing | Continuing | N/A |

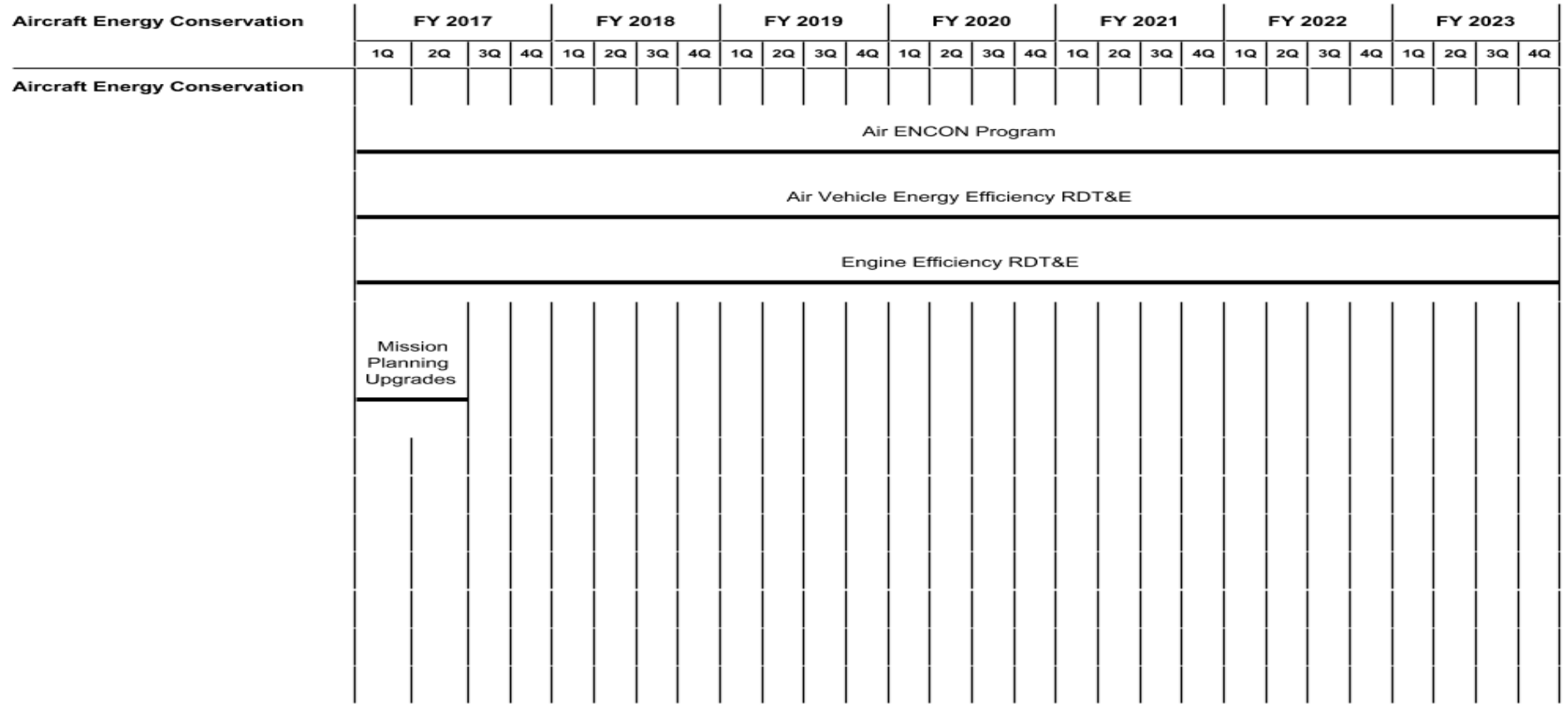
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management Support | WR | NAWCAD : Patuxent River, MD | 1.295 | 0.275 | Nov 2016 | 0.350 | Nov 2017 | 0.400 | Dec 2018 | - | | 0.400 | Continuing | Continuing | Continuing |
| Program Management Support | C/FFP | Deloitte Consulting : Alexandria, VA | 2.415 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.415 | 2.415 |
| Program Management Support | WR | NAWCWD : China Lake, CA | 0.010 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.010 | - |
| Prog Mgnt no longer funded in the FYDP | Various | Various : Various | 2.087 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.087 | - |
| | | **Subtotal** | 5.807 | 0.275 | | 0.350 | | 0.400 | | - | | 0.400 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 116.739 | 25.829 | | 10.424 | | 10.542 | | - | | 10.542 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603724N / *Navy Energy Program* | **Project (Number/Name)**<br>0996 / *Aircraft Energy Conservation* |




*2019DON - 0603724N - 0996*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603724N / *Navy Energy Program* | **Project (Number/Name)**<br>0996 / *Aircraft Energy Conservation* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Aircraft Energy Conservation*** | | | | |
| Aircraft Energy Conservation: Air ENCON Program | 1 | 2017 | 4 | 2023 |
| Aircraft Energy Conservation: Air Vehicle Energy Efficiency RDT&E | 1 | 2017 | 4 | 2023 |
| Aircraft Energy Conservation: Engine Efficiency RDT&E | 1 | 2017 | 4 | 2023 |
| Aircraft Energy Conservation: Mission Planning Upgrades | 1 | 2017 | 2 | 2017 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | | | | | R-1 Program Element (Number/Name)<br>PE 0603724N / *Navy Energy Program* | | | | Project (Number/Name)<br>9999 / *Congressional Adds* | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| 9999: *Congressional Adds* | 12.069 | 19.343 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 31.412 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Congressional Add for Hydrokinetic Energy Research

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2017 | FY 2018 |
|---|---|---|
| ***Congressional Add:*** Installation Energy Efficiency Enhancements<br>***FY 2017 Accomplishments:*** This congressional add will focus on areas that will cover power generation, energy storage, cyber security, and energy controls and analytics. Broad Area Announcement will be advertised on FedBizOps. Solicitation anticipated to be done by the end of September with the expectation of an award of funding by January 2018.<br>***FY 2018 Plans:*** N/A | 4.836 | 0.000 |
| ***Congressional Add:*** Program Increase: Renewable Energy Development<br>***FY 2017 Accomplishments:*** This congressional add will fund projects that will test wave energy conversion devices in the Navy's wave energy test site (WETS) in Hawaii. In addition, we will test marine hydrokinetic technologies in the Pacific Northwest and assess feasibility for other locations. Contract award/funds execution anticipated during the first quarter of FY18.<br>***FY 2018 Plans:*** N/A | 14.507 | 0.000 |
| **Congressional Adds Subtotals** | 19.343 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

RDTEN Contracts are Competitive Procurements

**E. Performance Metrics**

Quarterly Program Reviews

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603724N / *Navy Energy Program* | Project (Number/Name)<br>9999 / *Congressional Adds* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hydrokinetic Energy Research & Development | Various | EXWC : Port Hueneme, CA | 12.069 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 12.069 | - |
| Renewable Energy Development | Various | EXWC : Port Hueneme, CA | 0.000 | 14.507 | Jan 2018 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 14.507 | - |
| Installation Energy Efficiency Enhancements | Various | EXWC : Port Hueneme, CA | 0.000 | 4.836 | Jan 2018 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 4.836 | - |
| | | **Subtotal** | 12.069 | 19.343 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 31.412 | N/A |

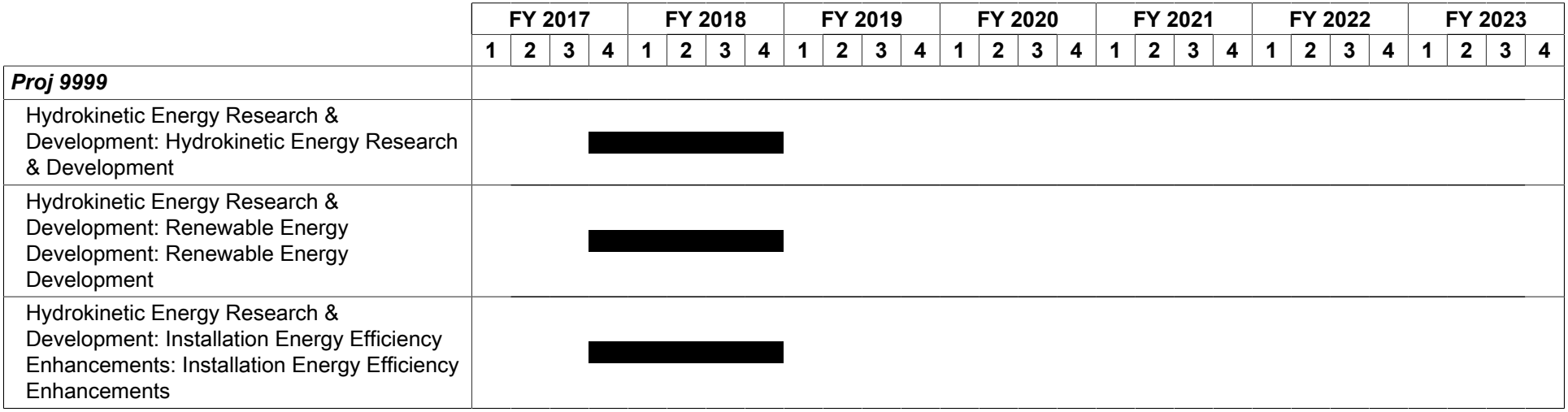
**Remarks**

Congressional Add Funds Received 3rd Quarter of 2017 for Projects C299 and C302.

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 12.069 | 19.343 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 31.412 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603724N / *Navy Energy Program* | **Project (Number/Name)**<br>9999 / *Congressional Adds* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603724N / *Navy Energy Program* | **Project (Number/Name)**<br>9999 / *Congressional Adds* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 9999*** | | | | |
| Hydrokinetic Energy Research & Development: Hydrokinetic Energy Research & Development | 4 | 2017 | 4 | 2018 |
| Hydrokinetic Energy Research & Development: Renewable Energy Development: Renewable Energy Development | 4 | 2017 | 4 | 2018 |
| Hydrokinetic Energy Research & Development: Installation Energy Efficiency Enhancements: Installation Energy Efficiency Enhancements | 4 | 2017 | 4 | 2018 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603725N *I Facilities Improvement* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 13.196 | 4.213 | 2.837 | 5.301 | - | 5.301 | 3.399 | 3.319 | 3.339 | 3.395 | Continuing | Continuing |
| 0995: *Naval Facilities System* | 7.769 | 2.066 | 1.786 | 4.078 | - | 4.078 | 2.199 | 2.164 | 2.170 | 2.212 | Continuing | Continuing |
| 3155: *Force Protection Ashore* | 2.944 | 1.230 | 1.051 | 1.223 | - | 1.223 | 1.200 | 1.155 | 1.169 | 1.183 | Continuing | Continuing |
| 3347: *Navy Expeditionary Energy Development* | 2.483 | 0.917 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 3.400 |

**A. Mission Description and Budget Item Justification**

Mission Description and Budget Item Justification:

This program provides for capabilities to: a) overcome performance limitations and reduce the life cycle cost of shore facilities and, b) provide protection against terrorist attacks for shore installations and their operations. The program focuses on technical and operational issues of specific Navy interest, where there are no unbiased test validated Commercial Off the Shelf (COTS) solutions available, and where timely capabilities may not materialize without specific demonstration or validation by the Navy. Additionally, the program completes the development of technologies originating from Navy, DOD and other sources of Science and Technology programs, including the National Science Foundation (NSF), the National Institute of Standards and Technology (NIST) and Department of Energy (DOE). Validated technologies are implemented in the Navy's Military Construction (MILCON) and Facilities, Sustainment Restoration and Modernization (FSRM) program, and Antiterrorism and Force Protection (ATFP) Other Procurement, Navy (OP,N) program.

Project 0995 addresses the following Navy facilities requirements during FY 2014 through FY 2020: Advance Technology for Waterfront Facilities Repair and Enhancements, Facilities Technologies to Reduce the Cost of Facilities Sustainment, Restoration and Modernization for reducing the total ownership cost (TOC) of future and existing Facilities and addressing natural and catastrophic risk of critical Naval Waterfront Facilities.

Force Protection Ashore Project 3155 addresses selective topics in modeling, and material technologies to reduce the vulnerability of installations; and reduce the acquisition and operating costs of protective technologies. The demonstrations and validations provide the independent, technical and operational test data for the development of competitive performance specifications to acquire the required capabilities. The ATFP project is coordinated with other DOD programs.

Project 3347: The Development of advanced Environmental Control Unit (ECU) for expeditionary force camp shelters project is a transition of a DOE FY12-14 funded project and is a continuation in technology development, and was transitioned to NAVFAC starting FY 2015.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | Date: February 2018 |
|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | R-1 Program Element (Number/Name)<br>PE 0603725N *I Facilities Improvement* | | |
| **B. Program Change Summary ($ in Millions)** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** |
| Previous President's Budget | 5.458 | 2.837 | 4.024 | - | 4.024 |
| Current President's Budget | 4.213 | 2.837 | 5.301 | - | 5.301 |
| Total Adjustments | -1.245 | 0.000 | 1.277 | - | 1.277 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | -1.053 | 0.000 | | | |
| • SBIR/STTR Transfer | -0.192 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | 1.493 | - | 1.493 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -0.216 | - | -0.216 |

**Change Summary Explanation**

Increase from FY18 to FY19 is due to a $2M increase for Port Damage Repair Joint Capability Technology Demonstration.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603725N / *Facilities Improvement* | Project (Number/Name)<br>0995 / *Naval Facilities System* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0995: *Naval Facilities System* | 7.769 | 2.066 | 1.786 | 4.078 | - | 4.078 | 2.199 | 2.164 | 2.170 | 2.212 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

This program provides the Navy with new engineering capabilities that are required to overcome specific performance limitations of Naval shore facilities while reducing the cost of sustaining the Naval shore infrastructure. The program focuses available RDT&E resources on satisfying facility requirements where the Navy is a major stakeholder or where there are no tested validated Commercial Off the Shelf (COTS) solutions available, and a timely solution will not emerge without a Navy sponsored demonstration and validation. The program completes the development and validation of facility technologies originating in Navy science and technology programs, plus a variety of other sources which includes the National Science Foundation (NSF) and the National Institute of Standards and Technology (NIST). This program introduces the idea of resilient facilities and infrastructure thru hardening, rapid assessment, and recovery. Validated technologies are implemented in the Navy's Military Construction (MILCON) and Facilities Sustainment Restoration and Modernization Programs (FSRM). The Duncan Hunter National Defense Authorization Act of 2009 laid down very specific guidelines for the correction of corrosion deficiencies in DoD shore facilities which is estimated to be $1.9B (DOD Annual Cost of Corrosion for the Department of Defense Facilities and Infrastructure July 2010).

Project 0995 addresses two Navy facilities requirements: 1) waterfront facilities repair, upgrade and service life extension; and, 2) validation testing/performance monitoring of critical facilities (such as dry docks, piers, runways, magazines, etc.), testing and evaluation of the performance of alternative materials, and surfacing concepts, and, methods and corrosion technologies to reduce the cost of Sustainment, Restoration and Modernization (SRM).

Waterfront facilities, repair, upgrade and service life extension:
An urgent requirement exists for early identification of strategies and solution recommendations for seismic risk at Naval Facilities, and especially nuclear capable waterfront facilities. Recent Pacific Rim earthquakes have heightened anxiety levels on perceived huge risks to Navy waterfront facilities in the region. The sub-project will provide analysis and solution recommendations for facilities impacted by seismic risk. Waterfront facilities repair and upgrade: About 75% of the Navy's waterfront facilities are over 45 years old. They were designed for a service life of 25 years which was to satisfy the mission requirements existing at that time. The over aged reinforced concrete requires costly and repetitive repairs. Besides providing more pier side ship maintenance and thus reduce dry dock costs, these piers must be strengthened to support concentrated crane loads up to 140 tons when piers were originally not designed for concentrated loads. Piers were previously designed to service one or possibly two particular ship classes. Berthing flexibility is now limited by mooring and utility arrangements. This sub-project addresses new material design methods, and retrofit methods which extends the service life of existing waterfront facilities by an additional 15 or more years. The project also addresses updating the mission based service, environmental, and protection loading requirements imposed by changes in platforms, operations and threats. Other initiatives include: leveraging Building Information Modeling (BIM) technology to provide for enhanced facilities management processes and waterfront utilities service enhancements using models to achieve flexible berthing arrangements consistent with current and future platform mooring configurations and hotel service requirements including Facilities and Infrastructure Integrated Product Support for Acquisition Category (ACAT) Programs.

Technologies to reduce the cost of Sustainment, Restoration and Modernization (SRM):

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603725N / *Facilities Improvement* | **Project (Number/Name)**<br>0995 / *Naval Facilities System* |

Technologies to reduce the cost of SRM issues of high operational significance are addressed on a priority basis. The Navy portion of corrosion deficiencies at DoD shore facilities is estimated to be $433M (DOD Annual Cost of Corrosion for the Department of Defense Facilities and Infrastructure July 2010). This effort will demonstrate and validate the cost and reliability of advanced corrosion technologies in order to assure their acceptance and implementation in traditionally conservative public works and construction industries. These facility corrosion technologies will accelerate the validation commercialization, and wide-spread implementation required to reduce the cost of correcting, the deficiencies in the Navy SRM backlog. The sub-projects include the continuing effort to validate, test and conduct performance monitoring of enhanced facility designs and coatings for facilities and equipment.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Waterfront facilities, repair, upgrade and service life extension: | 0.807 | 0.707 | 2.831 | 0.000 | 2.831 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY18 Plans to include:<br>- Facilities Hardening efforts which currently include the Fixed Facility Protection and High Altitude Electro Magnetic Pulse (HEMP) for Navy Ocean Cable Shore Facilities. Fixed Facility Protection is working to develop and validate facility structure to withstand high energy projectiles. The High Altitude Electro Magnetic Pulse project is working to develop and validate defensive facilities which will protect electronic equipment from being damaged by electromagnetic radiation bursts. Findings will transition into Unified Facilities Criteria (UFC) Project, in accordance with the DoD Instruction 4120.24.<br>- Facilities Recovery efforts which currently include Internal Curing of High Performance Concrete, Durable Concrete Repairs and Ultra High Performance Concrete for Structural Repairs. These projects are working to develop and validate concrete options for rapid repair and additional facilities infrastructure resiliency. Findings will transition into Unified Facilities Criteria (UFC) Project, in accordance with the DoD Instruction 4120.24.<br>- Facilities Rapid Assessment efforts currently include Floating Pier Hydrodynamic Evaluation, Pier Mooring Analysis, and an In-Situ Bollard Testing Device. These projects will develop and validate assessment techniques and build numerical models of structural joints subject to wave and tidal motions such as those found in dry docks, piers and wharves. These Use models will improve joint design through dynamic analysis and model refinement. Findings will transition into Unified Facilities Criteria (UFC) Project, in accordance with DoD Instruction 4120.24. | | | | | |
| ***FY 2019 Base Plans:***<br>- Expansion of Facilities Resiliency (Hardening, Rapid Assessment and Recovery) projects to further demonstrate and validate technologies.<br>- Funding the Asia Pacific Stability Initiative (APSI), which is a one-time funded requirement to complete repair for the Port Damage Repair Joint Capability Technology Demonstration (PDR/JCTD). The primary purpose of the funding will be to execute the final operational utility assessment (OUA) through procurement of equipment, as well as development of an engineering performance specification for transition. The work will be done at | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603725N / *Facilities Improvement* | **Project (Number/Name)**<br>0995 / *Naval Facilities System* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| both Naval Facilities Engineering and Expeditionary Warfare Center (Port Hueneme, CA) and at the Army Engineering Research and Development Center (Vicksburg, MS).<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY19 increase will fund APSI initiative to complete repairs on the PDR/JCTD. | | | | | |
| ***Title:*** Sustainment, Restoration & Modernization:<br>***Articles:***<br>***FY 2018 Plans:***<br>FY18 Plans to include:<br>-Development, testing and validation will continue with unmanned assessment devices such as the Camera Sled and the Unmanned Aerial Vehicle (UAV) for Facilities Inspection and Design Reconstruction. The Camera Sled has potential safety and cost benefits for inspecting pier pilings that are deeper than 100 feet. The Unmanned Aerial Vehicle for Facilities Inspection also has potential safety benefits by providing imagery of areas that may be deemed dangerous. The unmanned system will provide the necessary data processing, sensors, automatic control and communications in order to initiate autonomous systems to support Facilities Inspection Programs to include Airfield Pavements, Petroleum Oil Lubricant (POL) Facilities, Tall Towers, Roofing, etc. The autonomous nature of this technology will significantly increase inspection and design efficiency via faster execution and lower labor costs. Augmented Reality (AR) systems are being tested and evaluated for design and assessment uses.<br>-Expand analysis of Additive Manufacturing (AM) capabilities to include a Knowledge Database (KD) for facilities and infrastructure. The expansion will include both new and existing assets: Investigate existing and projected applications of Additive Manufacturing Knowledge Database (AMKD) to facilities and infrastructure. Define requirements for AMKD technology applications. Procure and evaluate Additive Manufacturing technology against requirements in developmental and operational tests. Findings will transition into unified facilities criteria.<br>***FY 2019 Base Plans:***<br>FY19 Plans to include:<br>- Develop, test and validate new concepts new concepts and technologies in the areas of corrosion. This includes the continued demonstration of cost (Return on Investment / ROI) and reliability of advanced corrosion technologies to assure their acceptance and implementation by conservative Public Works and construction industries. Identify technologies and products for accelerated implementation to reduce costs and reduce | 1.259<br>- | 1.079<br>- | 1.247<br>- | 0.000<br>- | 1.247<br>- |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603725N / *Facilities Improvement* | **Project (Number/Name)**<br>0995 / *Naval Facilities System* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| deficiencies in the Navy SRM backlog. Findings will transition into Unified Facilities Criteria (UFC) Project, in accordance with DoD Instruction 4120.24.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No significant change from FY18 to FY19. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 2.066 | 1.786 | 4.078 | 0.000 | 4.078 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The Projects identified in this budget have been carefully selected to respond to both the facilities support for new Acquisition Category Programs, to address TOC considerations of an evolving and aging infrastructure, and to facilitate rational risk based decisions and solutions to protect and decrease risk levels for Department of the Navy-critical infrastructure and facilities. Each project has been assessed to ensure that it is addressing legitimate risks and requirements of the shore establishment. The results of these projects will be the development of design and construction criteria and or components that directly impact the shore facilities.

**E. Performance Metrics**

Quarterly Program Reviews are conducted with the major performers to include funds status discussion, schedule review, assessment of plan to actual to meet benchmarks at midyear and end-of-year for PY1 and CY, and review of accomplishments and issues to date.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603725N / *Facilities Improvement* | **Project (Number/Name)**<br>0995 / *Naval Facilities System* |

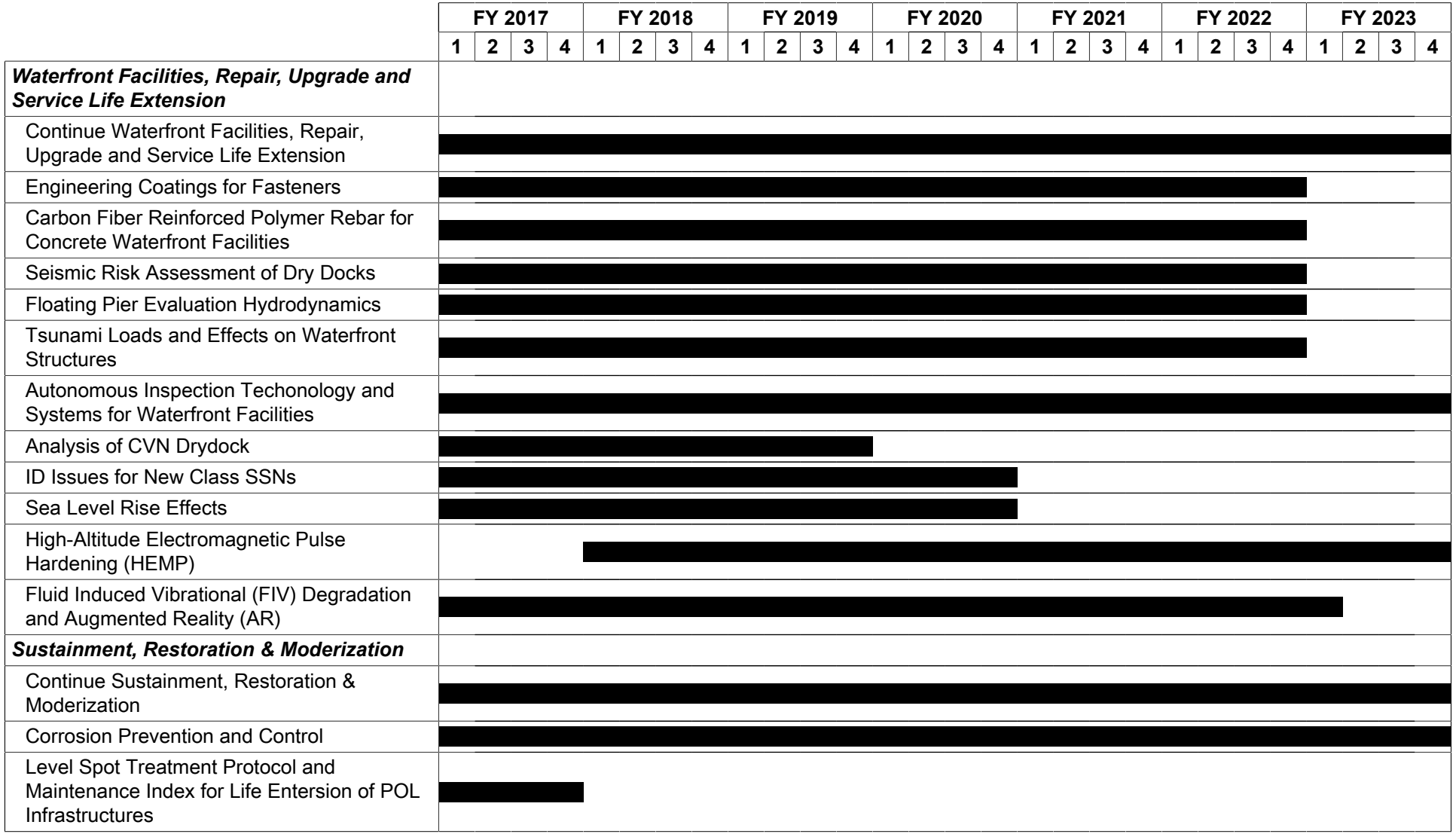
**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Waterfront Facilities, Repair, Upgrade and Services Life Extension | Various | NAVFAC EXWC : Pt Hueneme, CA | 2.782 | 0.807 | Oct 2016 | 0.707 | Dec 2017 | 2.831 | Oct 2018 | - | | 2.831 | Continuing | Continuing | Continuing |
| Sustainment, Restoration and Modernization | Various | NAVFAC EXWC : Pt Hueneme, CA | 4.987 | 1.259 | Oct 2016 | 1.079 | Oct 2017 | 1.247 | Oct 2018 | - | | 1.247 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 7.769 | 2.066 | | 1.786 | | 4.078 | | - | | 4.078 | Continuing | Continuing | N/A |

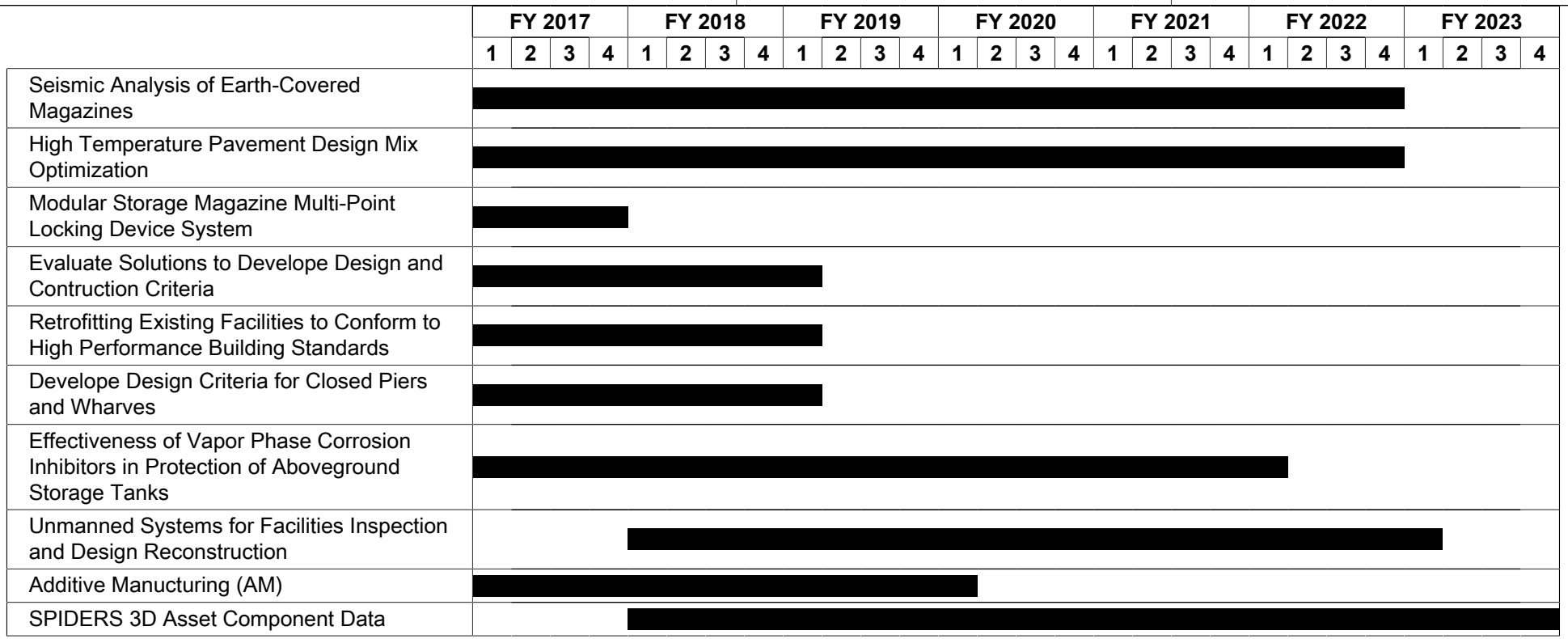
| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 7.769 | 2.066 | | 1.786 | | 4.078 | | - | | 4.078 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603725N / *Facilities Improvement* | **Project (Number/Name)**<br>0995 / *Naval Facilities System* |



| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603725N / *Facilities Improvement* | **Project (Number/Name)**<br>0995 / *Naval Facilities System* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603725N / *Facilities Improvement* | **Project (Number/Name)**<br>0995 / *Naval Facilities System* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Waterfront Facilities, Repair, Upgrade and Service Life Extension*** | | | | |
| Continue Waterfront Facilities, Repair, Upgrade and Service Life Extension | 1 | 2017 | 4 | 2023 |
| Engineering Coatings for Fasteners | 1 | 2017 | 4 | 2022 |
| Carbon Fiber Reinforced Polymer Rebar for Concrete Waterfront Facilities | 1 | 2017 | 4 | 2022 |
| Seismic Risk Assessment of Dry Docks | 1 | 2017 | 4 | 2022 |
| Floating Pier Evaluation Hydrodynamics | 1 | 2017 | 4 | 2022 |
| Tsunami Loads and Effects on Waterfront Structures | 1 | 2017 | 4 | 2022 |
| Autonomous Inspection Techonology and Systems for Waterfront Facilities | 1 | 2017 | 4 | 2023 |
| Analysis of CVN Drydock | 1 | 2017 | 4 | 2019 |
| ID Issues for New Class SSNs | 1 | 2017 | 4 | 2020 |
| Sea Level Rise Effects | 1 | 2017 | 4 | 2020 |
| High-Altitude Electromagnetic Pulse Hardening (HEMP) | 1 | 2018 | 4 | 2023 |
| Fluid Induced Vibrational (FIV) Degradation and Augmented Reality (AR) | 1 | 2017 | 1 | 2023 |
| ***Sustainment, Restoration & Moderization*** | | | | |
| Continue Sustainment, Restoration & Moderization | 1 | 2017 | 4 | 2023 |
| Corrosion Prevention and Control | 1 | 2017 | 4 | 2023 |
| Level Spot Treatment Protocol and Maintenance Index for Life Entersion of POL Infrastructures | 1 | 2017 | 4 | 2017 |
| Seismic Analysis of Earth-Covered Magazines | 1 | 2017 | 4 | 2022 |
| High Temperature Pavement Design Mix Optimization | 1 | 2017 | 4 | 2022 |
| Modular Storage Magazine Multi-Point Locking Device System | 1 | 2017 | 4 | 2017 |
| Evaluate Solutions to Develope Design and Contruction Criteria | 1 | 2017 | 1 | 2019 |
| Retrofitting Existing Facilities to Conform to High Performance Building Standards | 1 | 2017 | 1 | 2019 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603725N / *Facilities Improvement* | **Project (Number/Name)**<br>0995 / *Naval Facilities System* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Develope Design Criteria for Closed Piers and Wharves | 1 | 2017 | 1 | 2019 |
| Effectiveness of Vapor Phase Corrosion Inhibitors in Protection of Aboveground Storage Tanks | 1 | 2017 | 1 | 2022 |
| Unmanned Systems for Facilities Inspection and Design Reconstruction | 1 | 2018 | 1 | 2023 |
| Additive Manucturing (AM) | 1 | 2017 | 1 | 2020 |
| SPIDERS 3D Asset Component Data | 1 | 2018 | 4 | 2023 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603725N / *Facilities Improvement* | Project (Number/Name)<br>3155 / *Force Protection Ashore* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3155: *Force Protection Ashore* | 2.944 | 1.230 | 1.051 | 1.223 | - | 1.223 | 1.200 | 1.155 | 1.169 | 1.183 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Protection of Navy installations against terrorist activities requires deployment of advanced technology for force protection capabilities. This antiterrorism and force protection (AT/FP) ashore project will develop, demonstrate and validate technologies for the following: access control and integrated perimeter security surveillance sensors and intelligent electronic security systems for automated intruder detection (Installation Protection); perimeter security; waterside protection against craft and swimmer intrusion; secure and efficient operations centers and emergency management centers including human and information support systems (Command and Control). Programs currently being evaluated are, standard-based enterprise physical security system integration and automation; Command, Control, and Communications (C3) capabilities for emergency operations; integrated and networked mass notification systems (MNS); Waterside intelligent video security systems; integrated over-the-water sensors and analytics for automated course of action planning; identifying and interdicting malevolent threats - watercraft, swimmers, divers, and unmanned underwater vessels (UUVs) to reduce injury and death to the warfighter and damage to high value units (HVUs)(Waterside Protection). Through demonstration and validation of risk modeling and simulation models, the potential of emerging technologies will be evaluated and installation security strategies that reduce manpower and other costs will be formulated. Multiple systems with sensors and cameras are being deployed on Navy installations to be used for threat assessment. These systems are not integrated and there is not a centralized location or system that all the data can be analyzed. The Sensor Assessment Cell (SAC) brings all these sensor feeds into one location and the Physical Security Information Management (PSIM) software provides an integrated picture so that an intelligent assessment can be made. Current AT/FP systems to be integrated include Automated Vehicle Gates (AVG), Regional Alarms/Local Alarms (AMAS), Navy Munition Command enclave (NMC), and Electronic Harbor Security System. These demonstrations and validations derive advanced technology from science and technology programs of government academia and industry. The technology evaluation and validation produces data for performance specifications used for competitive procurement. All work will be coordinated with other programs and through industry forums as appropriate.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Force Protection Ashore | 1.230 | 1.051 | 1.223 | 0.000 | 1.223 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY 2018 Base Plans:<br>Funds will support continued and initiated projects from FY16 and FY17 as follow:<br>- Continue Installation Protection Capability Development - Airborne Threat project to detect, assess and classify for the defense against full-scale and man-deployable airborne threats (e.g., UAV, drones, remote-control [R/C] platforms.-Testing of three Counter UAS systems at NAWC China Lake. Test plan and test report deliverables- [$379K] - Developmental Test & Evaluation (DT); NAWCAD/ONR. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603725N / *Facilities Improvement* | **Project (Number/Name)**<br>3155 / *Force Protection Ashore* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Continue Command and Control Capability Development Virtual Field Support project to improve efficiency, effectiveness and reliability of the recovery of operational availability during critical system failures (corrective maintenance) and specialized routine maintenance (preventative maintenance).Developers to integrate alarm aggregator into virtual host and interface with Computer Aided Dispatch CAD system and Physical Information Security Manager PSIM. Deliverables include software source code, binaries, and software manuals. - [$262K] - Developmental Test & Evaluation (DT);SSC PAC: San Diego, CA.<br>- Continue Waterside Protection - Boat Barriers project to access performance, environmental, and operational impact and added benefits of next generation boat barriers using bidirectional technology. - Pilot to deploy Next Gen Water Barrier at Norfolk Naval Station between pier 10 and 10a. NSWC Panama City. Deliverables include deployment of barrier, test plan and test reports.[$410K] - Developmental Test & Evaluation (OT); CTTSO. | | | | | |
| ***FY 2019 Base Plans:***<br>FY 2019 Base Plans:<br>- Continue Installation Protection Capability Development - Airborne Threat project to detect, assess and classify for<br>the defense against full-scale and man-deployable airborne threats (e.g., UAV, drones, remote-control [R/C] platforms).Emphasis on mobile Counter UAS systems and direct control of UAS system. Testing at NAWC China Lake. Test plan and test report deliverables-[$330K] - Developmental Test & Evaluation (DT); NAWCAD/ONR.<br>- Continue Command and Control Capability Development Virtual Field Support project to improve efficiency, effectiveness and reliability of the recovery of operational availability during critical system failures (corrective maintenance) and specialized routine maintenance (preventative maintenance). Integrate system interfaces<br>in a virtual environment to include CUAS and EHSS. Deliverables include software source code, binaries, and software manuals - [$220K] - Developmental Test & Evaluation (DT); SSC Atlantic.<br>- Continue Waterside Protection - Boat Barriers project to access performance, environmental, and operational impact<br>and added benefits of next generation boat barriers using bidirectional technology. Independent Testing of boat barriers by John Hopkins APL. Deliverables include testing of boat barrier, test plan and test reports [$369K] - Developmental Test & Evaluation (OT).<br>- Sensor Assessment Cell (SAC) Project to develop, test and integrate a system of AT/FP sensors/camera's and provide an integrated picture to trained operators, who will assess information provided to them via a Physical Security Information System(PSIM) and determine if the event captured should trigger a dispatch of first responders. Test and develop CONOPS for regionally monitoring all alarms and sensors at a central location | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603725N / *Facilities Improvement* | **Project (Number/Name)**<br>3155 / *Force Protection Ashore* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| and interfacing with ENERMS directly. Deliverables include SAC testing at the SW region RDC, test plan and test report. [$304K].<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No significant change from FY18 to FY19. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 1.230 | 1.051 | 1.223 | 0.000 | 1.223 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Demonstration and validation is conducted for maximum transfer and interaction with industry such as to influence the industry COTS with the results of this demonstration and prototype validation. Acquisition is based on performance specifications enabled by this project.

**E. Performance Metrics**

Quarterly program reviews to include funds status, schedule review and assessment of plan to actual.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603725N / *Facilities Improvement* | Project (Number/Name)<br>3155 / *Force Protection Ashore* | |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Command and Control Capability Development: Government Engineering Support | Various | SPAWAR : San Diego, CA | 0.499 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Installation Protection: Airborne Threat | WR | NAWCAD/ONR : Pax River, MD | 0.000 | 0.538 | Feb 2017 | 0.379 | Feb 2018 | 0.330 | Nov 2018 | - | | 0.330 | 0.000 | 1.247 | - |
| Command and Control Capability Development: Virtual Field Support | WR | SPAWAR : San Diego, CA | 0.000 | 0.425 | Feb 2017 | 0.262 | Feb 2018 | 0.220 | Nov 2018 | - | | 0.220 | 0.000 | 0.907 | - |
| Waterside Protection: Boat Barriers | C/CPFF | CTTSO : CTTSO | 0.000 | 0.267 | Feb 2017 | 0.410 | Feb 2018 | 0.369 | Nov 2018 | - | | 0.369 | 0.000 | 1.046 | - |
| Sensor Assessment Cell (SAC) Capability Development | Various | SPAWAR : San Diego, CA | 0.000 | 0.000 | | 0.000 | | 0.304 | Nov 2018 | - | | 0.304 | 0.000 | 0.304 | - |
| Installation Protection Capability Development - Integrated Physical Security and Access Control Automation: Spiral Development | Various | NSWC : Dahlgren, VA | 0.597 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Installation Protection Capability Development -Integrated Physical Security and Access Control Automation:Test & Evaluation (DT) | Various | NSWC : Dahlgren, VA | 0.449 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Installation Protection Capability Development - Integrated Physical Security and Access Control Automation:Test & Evaluation (OT) | Various | SPAWAR : San Diego, CA | 0.332 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Water Protection - Common Information Exchange Spiral Development | WR | SSC-PAC : SSC-PAC | 0.244 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603725N / *Facilities Improvement* | **Project (Number/Name)**<br>3155 / *Force Protection Ashore* |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Installation Protection - Versatile Access Control Spiral Development | WR | NSWC : Dahlgren, VA | 0.339 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Waterside Protection - Boat Barrier Electronic Infrastructure - Spiral Development | WR | SSC-PAC : SSC-PAC | 0.484 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 2.944 | 1.230 | | 1.051 | | 1.223 | | - | | 1.223 | Continuing | Continuing | N/A |

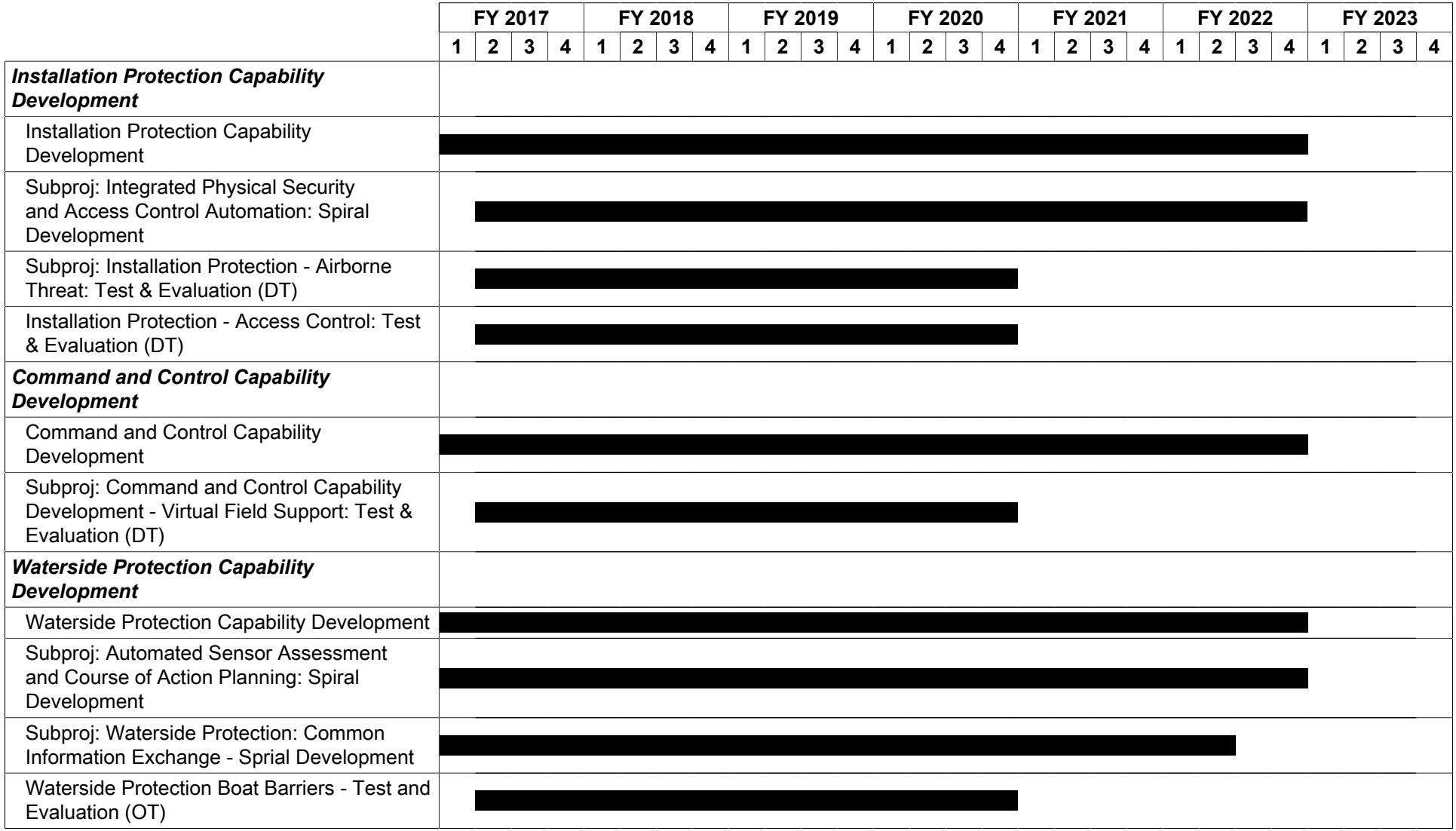
**Remarks**

As a result of FY16 decrease in funding levels the Installation Protection Capability Development - Incident Management System (IMS) - Spiral Development project is now rescheduled for FY17 and FY18 restoral funds.Installation Protection: Access Control Automation

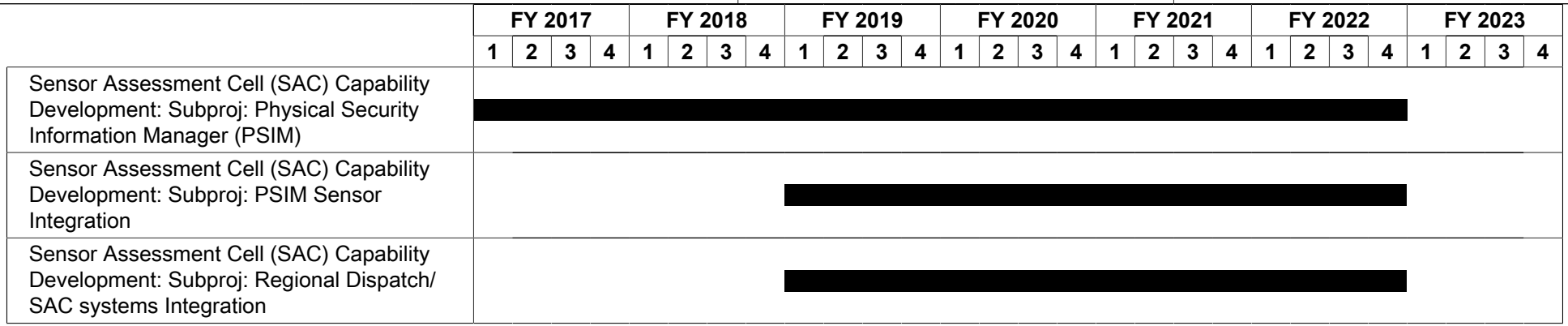
| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 2.944 | 1.230 | | 1.051 | | 1.223 | | - | | 1.223 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603725N / *Facilities Improvement* | **Project (Number/Name)**<br>3155 / *Force Protection Ashore* |



| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603725N / *Facilities Improvement* | **Project (Number/Name)**<br>3155 / *Force Protection Ashore* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603725N / *Facilities Improvement* | **Project (Number/Name)**<br>3155 / *Force Protection Ashore* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Installation Protection Capability Development*** | | | | |
| Installation Protection Capability Development | 1 | 2017 | 4 | 2022 |
| Subproj: Integrated Physical Security and Access Control Automation: Spiral Development | 2 | 2017 | 4 | 2022 |
| Subproj: Installation Protection - Airborne Threat: Test & Evaluation (DT) | 2 | 2017 | 4 | 2020 |
| Installation Protection - Access Control: Test & Evaluation (DT) | 2 | 2017 | 4 | 2020 |
| ***Command and Control Capability Development*** | | | | |
| Command and Control Capability Development | 1 | 2017 | 4 | 2022 |
| Subproj: Command and Control Capability Development - Virtual Field Support: Test & Evaluation (DT) | 2 | 2017 | 4 | 2020 |
| ***Waterside Protection Capability Development*** | | | | |
| Waterside Protection Capability Development | 1 | 2017 | 4 | 2022 |
| Subproj: Automated Sensor Assessment and Course of Action Planning: Spiral Development | 1 | 2017 | 4 | 2022 |
| Subproj: Waterside Protection: Common Information Exchange - Sprial Development | 1 | 2017 | 2 | 2022 |
| Waterside Protection Boat Barriers - Test and Evaluation (OT) | 2 | 2017 | 4 | 2020 |
| Sensor Assessment Cell (SAC) Capability Development: Subproj: Physical Security Information Manager (PSIM) | 1 | 2017 | 4 | 2022 |
| Sensor Assessment Cell (SAC) Capability Development: Subproj: PSIM Sensor Integration | 1 | 2019 | 4 | 2022 |
| Sensor Assessment Cell (SAC) Capability Development: Subproj: Regional Dispatch/ SAC systems Integration | 1 | 2019 | 4 | 2022 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603725N / *Facilities Improvement* | Project (Number/Name)<br>3347 / *Navy Expeditionary Energy Development* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3347: *Navy Expeditionary Energy Development* | 2.483 | 0.917 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 3.400 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Development of advanced Environmental Control Unit (ECU) for expeditionary force camp shelters will reduce the heating and air-conditioning (HVAC) fuel consumption by 50% and also will reduce fuel transport convoys, and attendant manpower casualties and handling labor.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Expeditionary Environmental Control Unit (EECU) | 0.917 | 0.000 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>N/A | | | | | |
| ***FY 2019 Base Plans:***<br>N/A | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.917 | 0.000 | 0.000 | 0.000 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Development of this technology will continue in partnership with the Advanced Research Projects Agency-Energy (ARPA-E). The Navy is positioned to transition the technology into a procurement program once technologies are operationally test and accepted. Additionally, the Navy is pursuing methods to transition the program to the DoD Program Manager for Mobile Electric Power so that all of DoD can benefit from this latest generation, energy saving technology.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603725N / *Facilities Improvement* | **Project (Number/Name)**<br>3347 / *Navy Expeditionary Energy Development* |

**E. Performance Metrics**

Quarterly Program Reviews will be conducted with the major performer to include cost, schedule, and performance risks for milestone achievement associated with the full scale prototypes

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603725N / *Facilities Improvement* | **Project (Number/Name)**<br>3347 / *Navy Expeditionary Energy Development* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Expeditionary Environmental Control Unit (EECU) | Various | EXWC : Port Hueneme, CA | 2.483 | 0.917 | Jan 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.400 | Continuing |
| | | **Subtotal** | 2.483 | 0.917 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.400 | N/A |

| | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 2.483 | 0.917 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.400 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603725N / *Facilities Improvement* | **Project (Number/Name)**<br>3347 / *Navy Expeditionary Energy Development* |

| | FY 2017 | | | | FY 2018 | | | | FY 2019 | | | | FY 2020 | | | | FY 2021 | | | | FY 2022 | | | | FY 2023 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| ***Proj 3347*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Expeditionary Environmental Control Unit (ECU) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603725N / *Facilities Improvement* | **Project (Number/Name)**<br>3347 / *Navy Expeditionary Energy Development* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3347*** | | | | |
| Expeditionary Environmental Control Unit (ECU) | 1 | 2017 | 1 | 2017 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603734N *I (U)CHALK CORAL* |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Program Element | 0.000 | 225.665 | 245.143 | 267.985 | - | 267.985 | 229.547 | 320.097 | 325.442 | 463.457 | Continuing | Continuing |
| 1804: *Chalk Coral* | 0.000 | 225.665 | 245.143 | 267.985 | - | 267.985 | 229.547 | 320.097 | 325.442 | 463.457 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

This program is reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 245.860 | 245.143 | 290.722 | - | 290.722 |
| Current President's Budget | 225.665 | 245.143 | 267.985 | - | 267.985 |
| Total Adjustments | -20.195 | 0.000 | -22.737 | - | -22.737 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | 1.550 | 0.000 | | | |
| • SBIR/STTR Transfer | -6.619 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | -27.704 | - | -27.704 |
| • Rate/Misc Adjustments | -0.001 | 0.000 | 4.967 | - | 4.967 |
| • Congressional General Reductions Adjustments | -0.125 | - | - | - | - |
| • Congressional Directed Reductions Adjustments | -15.000 | - | - | - | - |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603739N *I Navy Logistic Productivity* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 45.634 | 2.973 | 2.995 | 4.059 | - | 4.059 | 4.018 | 3.957 | 4.040 | 4.125 | Continuing | Continuing |
| 2955: *JEDMICS* | 43.454 | 2.109 | 2.391 | 2.913 | - | 2.913 | 2.925 | 2.980 | 3.043 | 3.107 | Continuing | Continuing |
| 3223: *Logistics R&D* | 2.180 | 0.864 | 0.604 | 1.146 | - | 1.146 | 1.093 | 0.977 | 0.997 | 1.018 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

Includes development and evaluation of incentive systems for improving the productivity of civilian and military personnel. Identifies barriers to increased productivity and evaluates the effect of removing them. Develops techniques for easing the introduction of new technology to the work place. Identifies and evaluates methods for improving the quality of work-life.

Excludes civilian and military manpower and their related costs and military construction costs which are included in appropriate Management and Support elements in this program.

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under ADVANCED COMPONENT DEVELOPMENT AND PROTOTYPES because it includes all efforts necessary to evaluate integrated technologies, representative models or prototype systems in a high fidelity and realistic operating environment.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 3.089 | 2.995 | 3.357 | - | 3.357 |
| Current President's Budget | 2.973 | 2.995 | 4.059 | - | 4.059 |
| Total Adjustments | -0.116 | 0.000 | 0.702 | - | 0.702 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -0.116 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | 0.770 | - | 0.770 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -0.068 | - | -0.068 |

**Change Summary Explanation**

The FY 2018 request was reduced by -$0.351 million to account for the availability of prior year execution balances.

Technical: Not applicable.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603739N *I Navy Logistic Productivity* |

Schedule: Not applicable.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603739N / *Navy Logistic Productivity* | Project (Number/Name)<br>2955 / *JEDMICS* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2955: *JEDMICS* | 43.454 | 2.109 | 2.391 | 2.913 | - | 2.913 | 2.925 | 2.980 | 3.043 | 3.107 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

In FY85 Congress directed the Services and Defense Logistics Agency to permanently capture, manage and control engineering data in digital format so it would be available to support competitive spares re-procurement. The Joint Engineering Data Management Information & Control System (JEDMICS) program manages and controls 100,000,000 engineering images and has 13,000 authorized users responsible for over 77,000 user sessions per month. Over 1.2 million digital images are retrieved each month. New data and new users are added each month as DoD re-engineers its business processes to take advantage of digital data that is managed and controlled for corporate reuse. The JEDMICS system is deployed at 5 interoperable sites that service user locations worldwide. Data stored in JEDMICS is used for Logistics Support, Spares re-procurement, Weapons Systems procurement, Engineering, Maintenance, Distribution, Manufacturing, Air National Guard and Deployed Engineering Technical Services organizations. JEDMICS facilitates work process re-design since it brings the electronic drawings to the desktop, shop floor or flight line in real time eliminating walk, wait and slack time to retrieve drawings. Additionally, Administrative Lead Time, Repair Turn Around Time, Engineering Change Proposal processing time, demilitarization time, and all cycle times dependent on engineering data have decreased with the real time availability of digital engineering data. JEDMICS also facilitates Electronic Commerce since it produces digital technical data packages that can be forwarded along with an electronic order. Funds are for Commercial Off The Shelf (COTS) test, evaluation and integration. JEDMICS development efforts are required to integrate and test COTS upgrades.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** JEDMICS Development | 2.059 | 2.339 | 2.861 | 0.000 | 2.861 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Conduct development efforts associated with JEDMICS software releases. Conduct COTS requirements definition, evaluation, integration and testing of annual baseline releases. Conduct technology insertion of the JEDMICS system that is required to protect the $21B digital data asset managed in JEDMICS.<br><br>These annual releases are necessary to incorporate changes that are essential to keeping the system running within the Navy's Enterprise. They include Service mandated Information Technology changes, storage capability increases for emerging engineering data formats, changes to accommodate commercial hardware and software end-of-life product obsolescence, and defenses for newly recognized Information Assurance vulnerabilities affecting the systems various software applications. | | | | | |
| ***FY 2018 Plans:***<br>Develop and integrate JEDMICS Software Release 3.0.19. | | | | | |
| ***FY 2019 Base Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603739N / *Navy Logistic Productivity* | **Project (Number/Name)**<br>2955 / *JEDMICS* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Develop and integrate JEDMICS Software Release 3.0.20.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>The funding increase from FY 2018 to FY 2019 supports development efforts associated with JEDMICS software releases. | | | | | |
| ***Title:*** JEDMICS Test<br>***Articles:***<br>***Description:*** Conduct test and readiness reviews and functional performance tests on JEDMICS system.<br>***FY 2018 Plans:***<br>Complete DT of JEDMICS Software Release 3.0.18. Initiate DT of JEDMICS Software Release 3.0.19.<br>***FY 2019 Base Plans:***<br>Complete DT of JEDMICS Software Release 3.0.19. Initiate DT of JEDMICS Software Release 3.0.20.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>There is no change from FY 2018 to FY 2019. | 0.026<br>- | 0.026<br>- | 0.026<br>- | 0.000<br>- | 0.026<br>- |
| ***Title:*** JEDMICS Evaluation & Review<br>***Articles:***<br>***Description:*** Conduct technical evaluations and configuration control reviews of JEDMICS system.<br>***FY 2018 Plans:***<br>Conduct technical evaluations and reviews for JEDMICS Software Release 3.0.20.<br>***FY 2019 Base Plans:***<br>Conduct technical evaluations and reviews for JEDMICS Software Release 3.0.21.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:*** | 0.024<br>- | 0.026<br>- | 0.026<br>- | 0.000<br>- | 0.026<br>- |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603739N / *Navy Logistic Productivity* | **Project (Number/Name)**<br>2955 / *JEDMICS* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| There is no change from FY 2018 to FY 2019. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 2.109 | 2.391 | 2.913 | 0.000 | 2.913 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Execution of sole-source negotiated requirements type contract for engineering, design, development and test efforts. Performance-based reviews conducted quarterly by the Project Management Office.

**E. Performance Metrics**

1. Complete testing, integration, & upgrade of three major embedded Commercial Off-the-Shelf products.
2. Test & integrate system Information Assurance Vulnerability Management software patch upgrades four times.
3. Complete development, testing, & integration of a minimum twenty corrected high-priority software problem reports.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603739N / *Navy Logistic Productivity* | Project (Number/Name)<br>2955 / *JEDMICS* | |

## Support ($ in Millions)

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Development Support | C/IDIQ | Smartronix Inc. : Hollywood, MD | 1.344 | 0.145 | Oct 2016 | 0.157 | Oct 2017 | 0.160 | Oct 2018 | - | | 0.160 | Continuing | Continuing | Continuing |
| Software Development | Various | Northrop Grumman Information : McLean, VA | 37.696 | 1.914 | Nov 2016 | 2.182 | Nov 2017 | 2.701 | Nov 2018 | - | | 2.701 | Continuing | Continuing | Continuing |
| Prior Year Support no Longer Funded in Budget Year or Out years | Various | Various : Various | 0.216 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.216 | - |
| | | **Subtotal** | 39.256 | 2.059 | | 2.339 | | 2.861 | | - | | 2.861 | Continuing | Continuing | N/A |

**Remarks**

Remarks: Funds are for development efforts associated with Commercial Off The Shelf (COTS) obsolescence on the fully deployed COTS Intensive Joint Engineering Data Management Infomation & Control System. Funds are for COTS evaulation, integration, and test and evaluation. The common baseline will be maintained and obsolete COTS software and hardware will be replaced. Baseline releases will protect joint interoperability, upgrade operating systems for security patches and supportable versions, support integration to replace obsolete COTS, and upgrade the Oracle database to supportable versions.

## Test and Evaluation ($ in Millions)

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Developmental Test & Evaluation | MIPR | WR-ALC/TILAB : Robins AFB, GA | 2.546 | 0.026 | Oct 2016 | 0.026 | Oct 2017 | 0.026 | Oct 2018 | - | | 0.026 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 2.546 | 0.026 | | 0.026 | | 0.026 | | - | | 0.026 | Continuing | Continuing | N/A |

**Remarks**

Supports testing and evaluation of baseline releases in a user environment.

## Management Services ($ in Millions)

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management Support | WR | Naval Air Warfare Center : NAS Patuxent River, MD | 0.292 | 0.013 | Oct 2016 | 0.015 | Oct 2017 | 0.015 | Oct 2018 | - | | 0.015 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603739N / *Navy Logistic Productivity* | Project (Number/Name)<br>2955 / *JEDMICS* | |

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Travel | Various | Various : Various | 0.277 | 0.011 | Jul 2017 | 0.011 | Jul 2018 | 0.011 | Jul 2019 | - | | 0.011 | Continuing | Continuing | Continuing |
| Prior Year Mgmt no Longer Funded in Budget Year or Out years | Various | Various : Various | 1.083 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.083 | - |
| | | **Subtotal** | 1.652 | 0.024 | | 0.026 | | 0.026 | | - | | 0.026 | Continuing | Continuing | N/A |

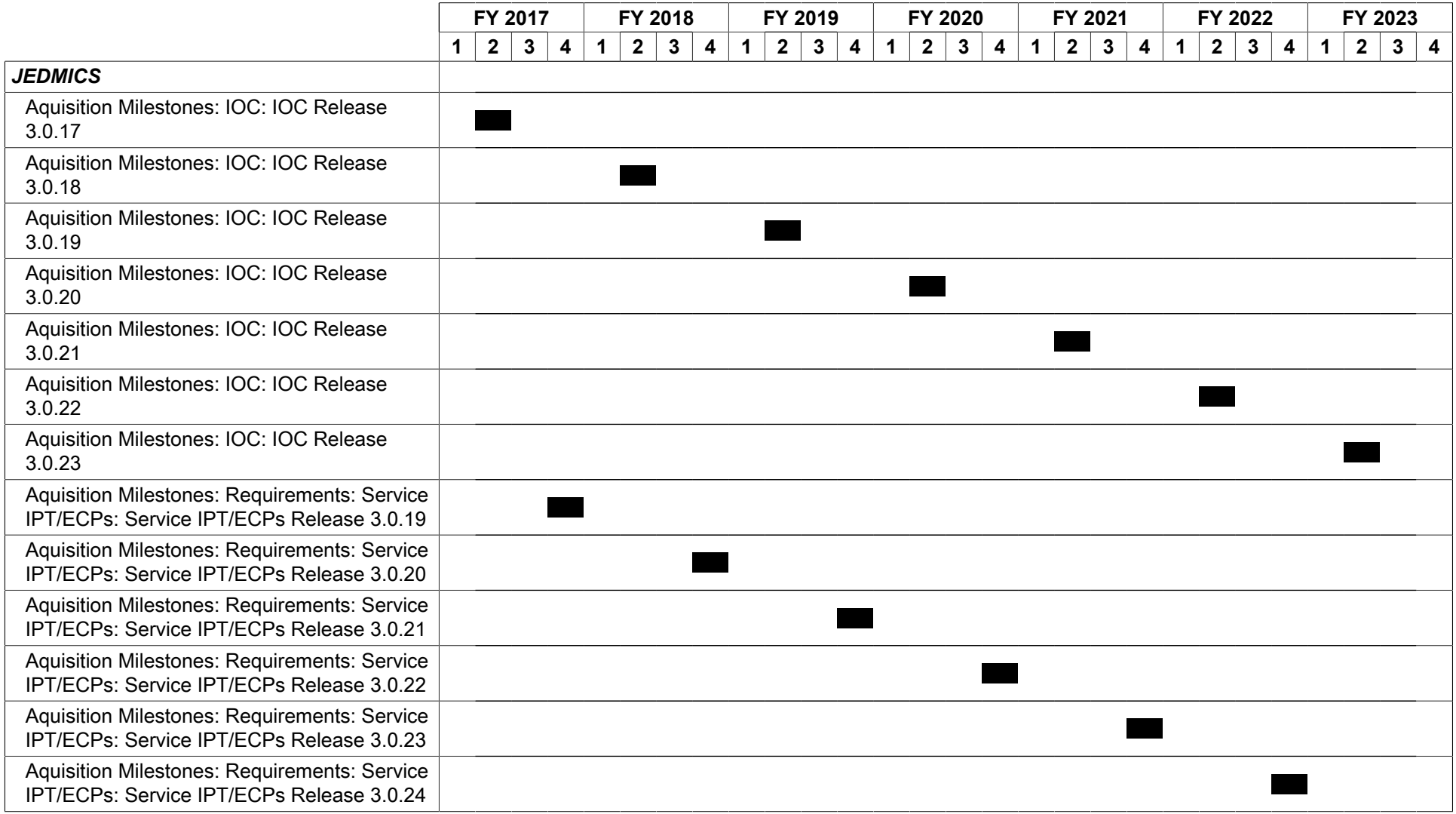
**Remarks**

Supports program compliance reviews and program related travel by government employees.

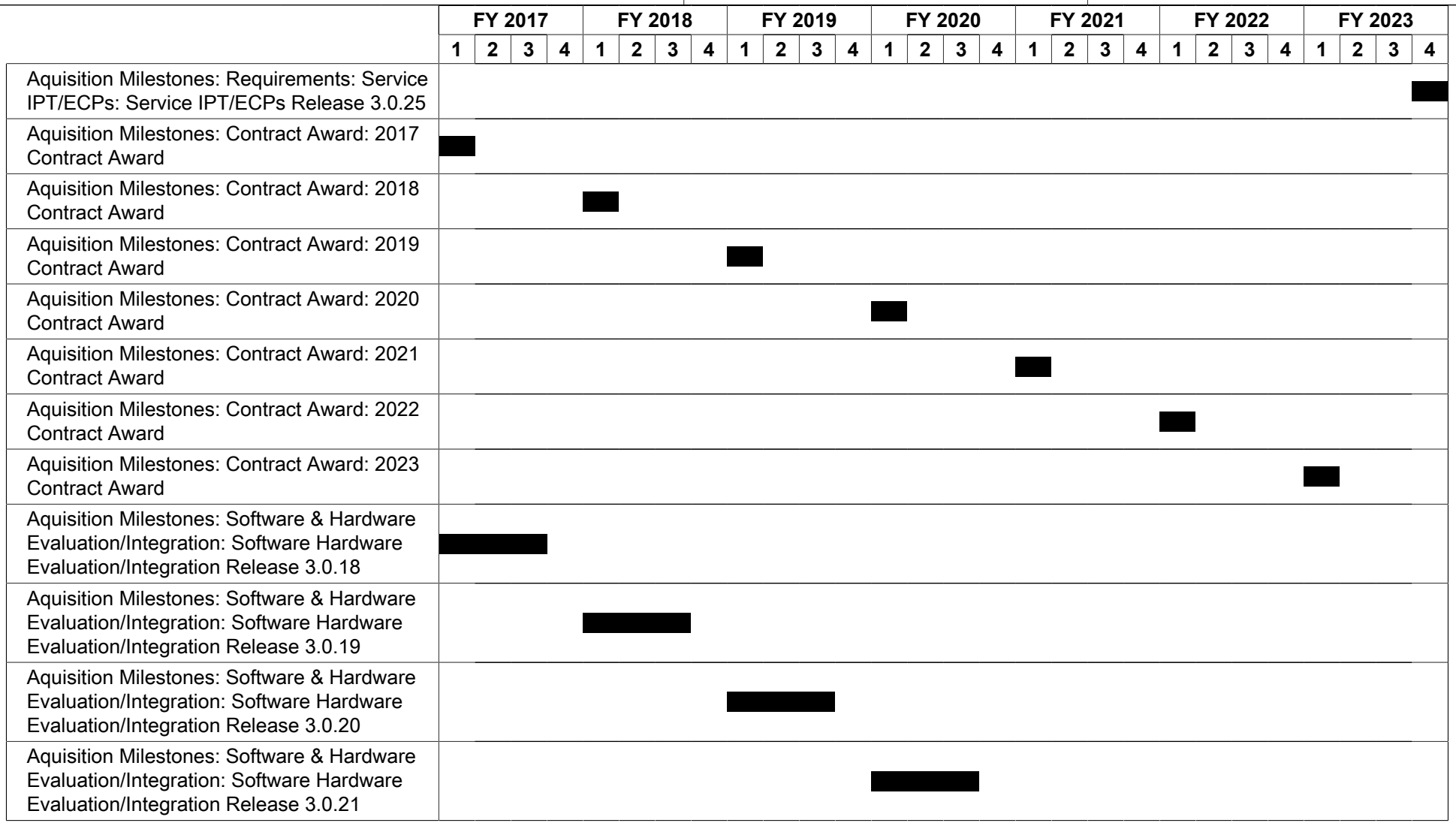
| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 43.454 | 2.109 | | 2.391 | | 2.913 | | - | | 2.913 | Continuing | Continuing | N/A |

**Remarks**

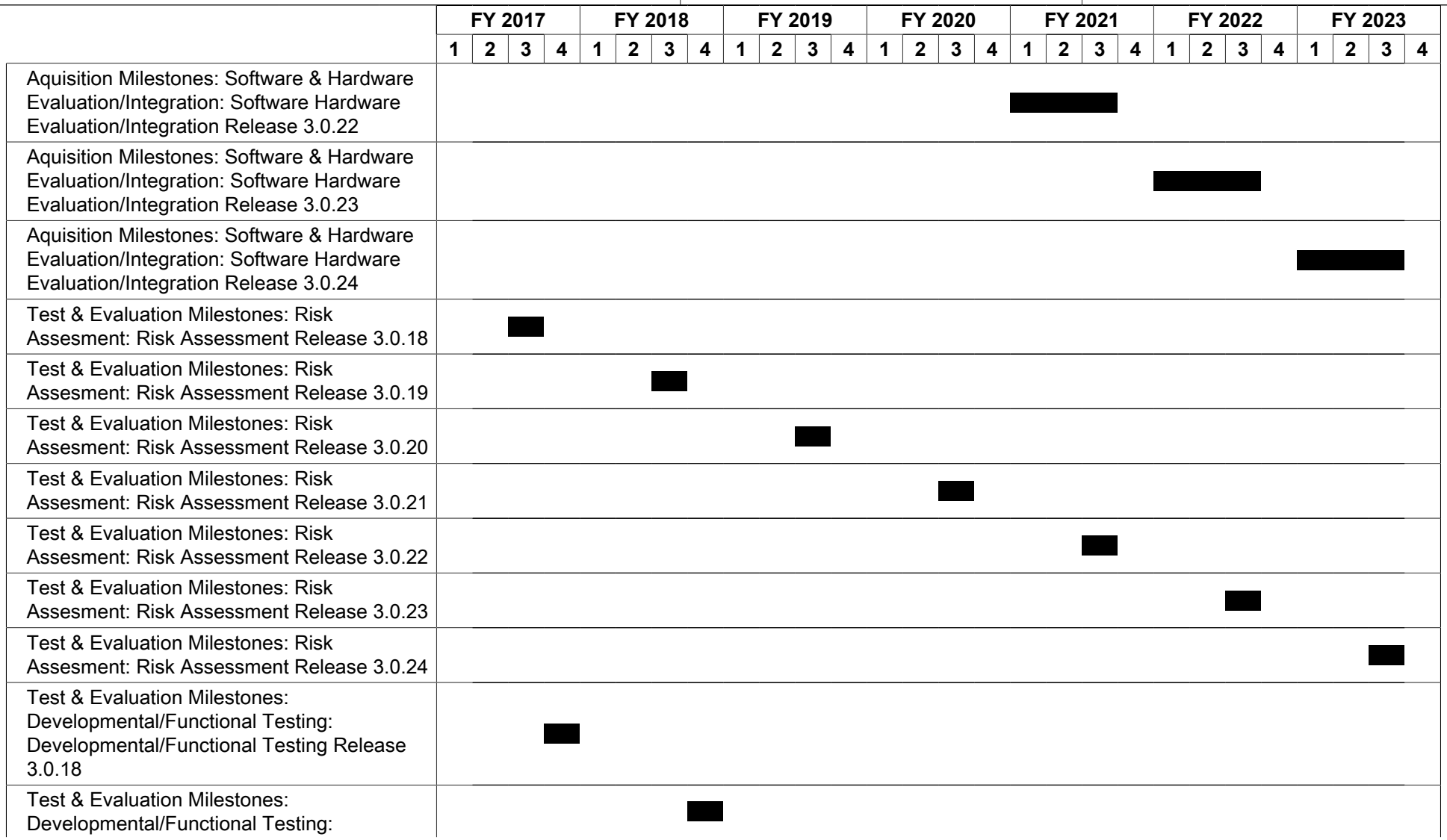
| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603739N / *Navy Logistic Productivity* | **Project (Number/Name)**<br>2955 / *JEDMICS* |



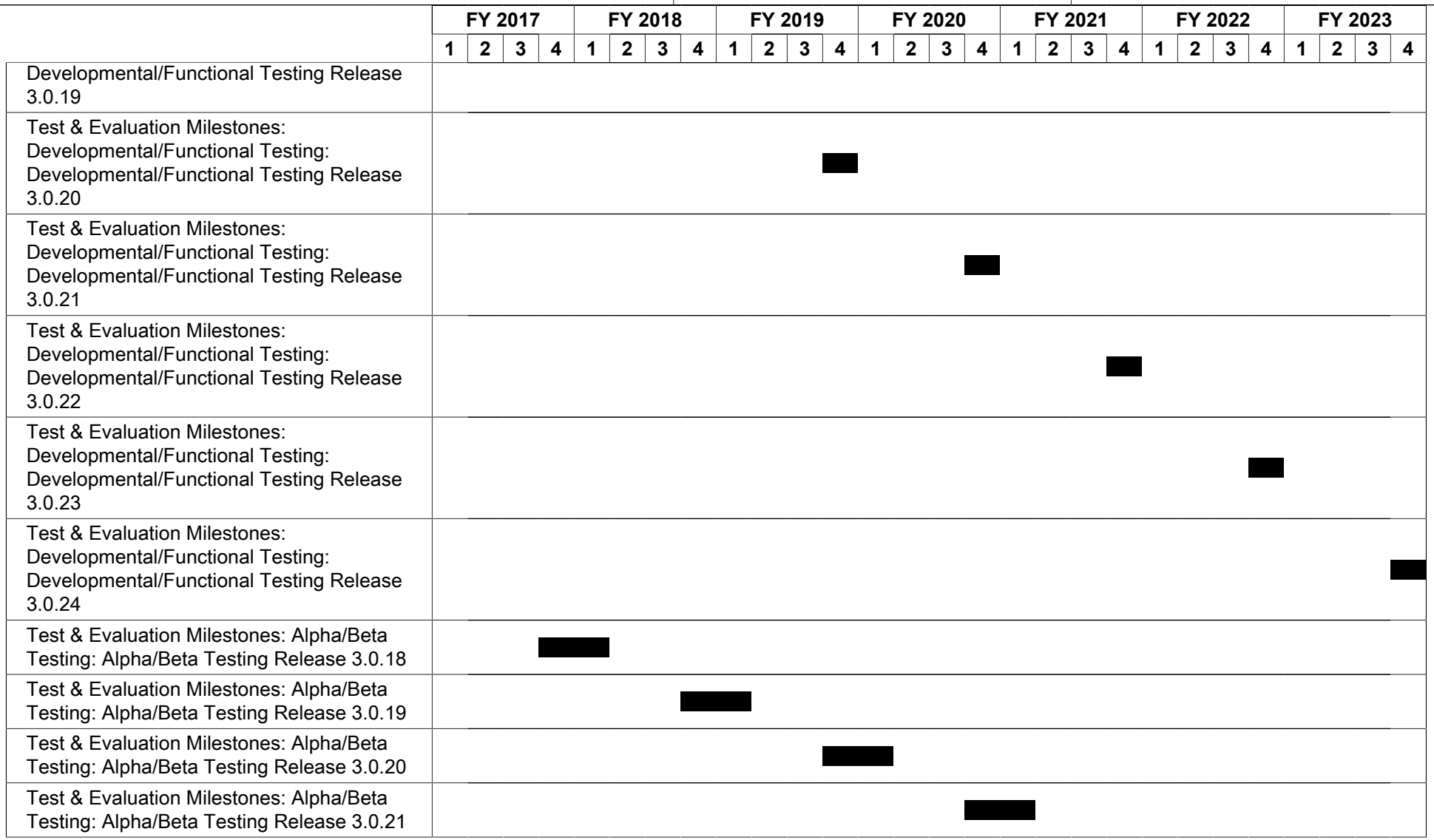
| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603739N / *Navy Logistic Productivity* | **Project (Number/Name)**<br>2955 / *JEDMICS* |



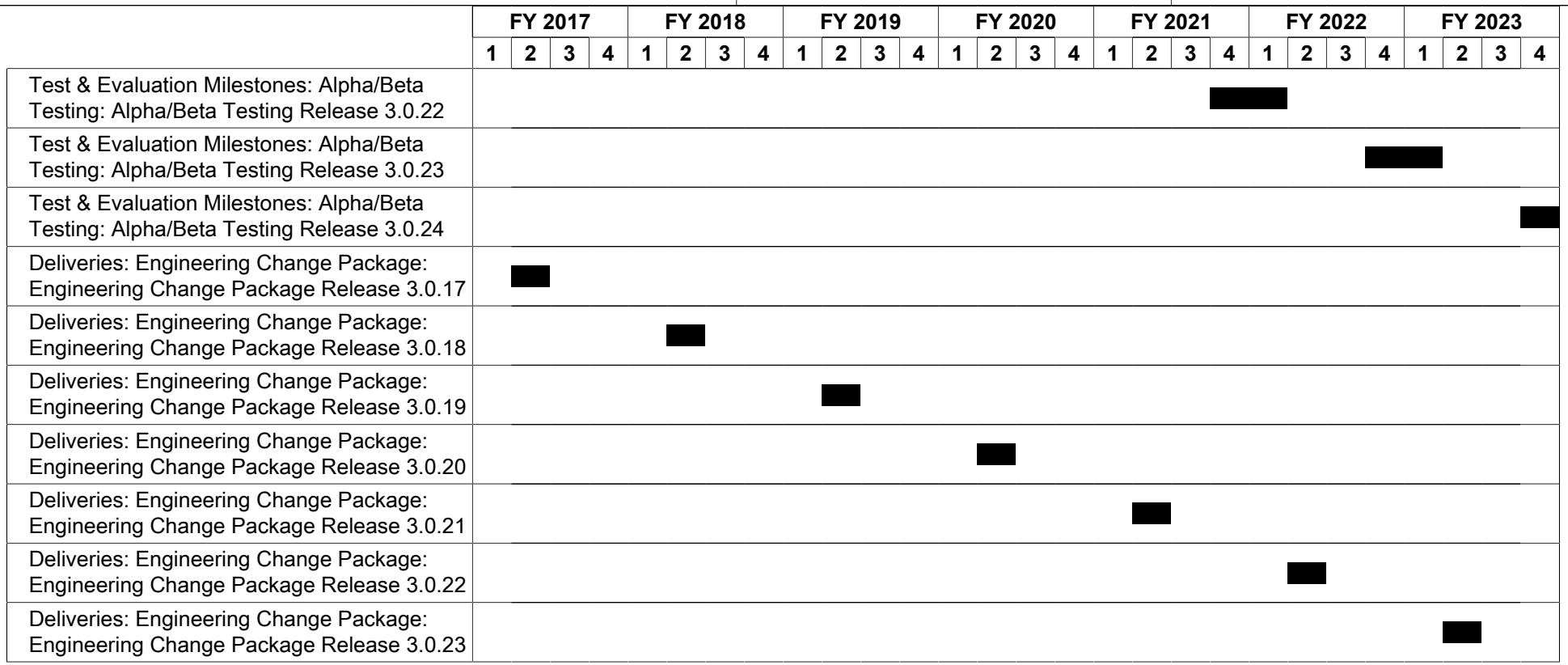
| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603739N / *Navy Logistic Productivity* | **Project (Number/Name)**<br>2955 / *JEDMICS* |



| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603739N / *Navy Logistic Productivity* | **Project (Number/Name)**<br>2955 / *JEDMICS* |



| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603739N / *Navy Logistic Productivity* | **Project (Number/Name)**<br>2955 / *JEDMICS* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603739N / *Navy Logistic Productivity* | **Project (Number/Name)**<br>2955 / *JEDMICS* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***JEDMICS*** | | | | |
| Aquisition Milestones: IOC: IOC Release 3.0.17 | 2 | 2017 | 2 | 2017 |
| Aquisition Milestones: IOC: IOC Release 3.0.18 | 2 | 2018 | 2 | 2018 |
| Aquisition Milestones: IOC: IOC Release 3.0.19 | 2 | 2019 | 2 | 2019 |
| Aquisition Milestones: IOC: IOC Release 3.0.20 | 2 | 2020 | 2 | 2020 |
| Aquisition Milestones: IOC: IOC Release 3.0.21 | 2 | 2021 | 2 | 2021 |
| Aquisition Milestones: IOC: IOC Release 3.0.22 | 2 | 2022 | 2 | 2022 |
| Aquisition Milestones: IOC: IOC Release 3.0.23 | 2 | 2023 | 2 | 2023 |
| Aquisition Milestones: Requirements: Service IPT/ECPs: Service IPT/ECPs Release 3.0.19 | 4 | 2017 | 4 | 2017 |
| Aquisition Milestones: Requirements: Service IPT/ECPs: Service IPT/ECPs Release 3.0.20 | 4 | 2018 | 4 | 2018 |
| Aquisition Milestones: Requirements: Service IPT/ECPs: Service IPT/ECPs Release 3.0.21 | 4 | 2019 | 4 | 2019 |
| Aquisition Milestones: Requirements: Service IPT/ECPs: Service IPT/ECPs Release 3.0.22 | 4 | 2020 | 4 | 2020 |
| Aquisition Milestones: Requirements: Service IPT/ECPs: Service IPT/ECPs Release 3.0.23 | 4 | 2021 | 4 | 2021 |
| Aquisition Milestones: Requirements: Service IPT/ECPs: Service IPT/ECPs Release 3.0.24 | 4 | 2022 | 4 | 2022 |
| Aquisition Milestones: Requirements: Service IPT/ECPs: Service IPT/ECPs Release 3.0.25 | 4 | 2023 | 4 | 2023 |
| Aquisition Milestones: Contract Award: 2017 Contract Award | 1 | 2017 | 1 | 2017 |
| Aquisition Milestones: Contract Award: 2018 Contract Award | 1 | 2018 | 1 | 2018 |
| Aquisition Milestones: Contract Award: 2019 Contract Award | 1 | 2019 | 1 | 2019 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603739N / *Navy Logistic Productivity* | **Project (Number/Name)**<br>2955 / *JEDMICS* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Aquisition Milestones: Contract Award: 2020 Contract Award | 1 | 2020 | 1 | 2020 |
| Aquisition Milestones: Contract Award: 2021 Contract Award | 1 | 2021 | 1 | 2021 |
| Aquisition Milestones: Contract Award: 2022 Contract Award | 1 | 2022 | 1 | 2022 |
| Aquisition Milestones: Contract Award: 2023 Contract Award | 1 | 2023 | 1 | 2023 |
| Aquisition Milestones: Software & Hardware Evaluation/Integration: Software Hardware Evaluation/Integration Release 3.0.18 | 1 | 2017 | 3 | 2017 |
| Aquisition Milestones: Software & Hardware Evaluation/Integration: Software Hardware Evaluation/Integration Release 3.0.19 | 1 | 2018 | 3 | 2018 |
| Aquisition Milestones: Software & Hardware Evaluation/Integration: Software Hardware Evaluation/Integration Release 3.0.20 | 1 | 2019 | 3 | 2019 |
| Aquisition Milestones: Software & Hardware Evaluation/Integration: Software Hardware Evaluation/Integration Release 3.0.21 | 1 | 2020 | 3 | 2020 |
| Aquisition Milestones: Software & Hardware Evaluation/Integration: Software Hardware Evaluation/Integration Release 3.0.22 | 1 | 2021 | 3 | 2021 |
| Aquisition Milestones: Software & Hardware Evaluation/Integration: Software Hardware Evaluation/Integration Release 3.0.23 | 1 | 2022 | 3 | 2022 |
| Aquisition Milestones: Software & Hardware Evaluation/Integration: Software Hardware Evaluation/Integration Release 3.0.24 | 1 | 2023 | 3 | 2023 |
| Test & Evaluation Milestones: Risk Assesment: Risk Assessment Release 3.0.18 | 3 | 2017 | 3 | 2017 |
| Test & Evaluation Milestones: Risk Assesment: Risk Assessment Release 3.0.19 | 3 | 2018 | 3 | 2018 |
| Test & Evaluation Milestones: Risk Assesment: Risk Assessment Release 3.0.20 | 3 | 2019 | 3 | 2019 |
| Test & Evaluation Milestones: Risk Assesment: Risk Assessment Release 3.0.21 | 3 | 2020 | 3 | 2020 |
| Test & Evaluation Milestones: Risk Assesment: Risk Assessment Release 3.0.22 | 3 | 2021 | 3 | 2021 |
| Test & Evaluation Milestones: Risk Assesment: Risk Assessment Release 3.0.23 | 3 | 2022 | 3 | 2022 |
| Test & Evaluation Milestones: Risk Assesment: Risk Assessment Release 3.0.24 | 3 | 2023 | 3 | 2023 |
| Test & Evaluation Milestones: Developmental/Functional Testing: Developmental/ Functional Testing Release 3.0.18 | 4 | 2017 | 4 | 2017 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603739N / *Navy Logistic Productivity* | **Project (Number/Name)**<br>2955 / *JEDMICS* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Test & Evaluation Milestones: Developmental/Functional Testing: Developmental/ Functional Testing Release 3.0.19 | 4 | 2018 | 4 | 2018 |
| Test & Evaluation Milestones: Developmental/Functional Testing: Developmental/ Functional Testing Release 3.0.20 | 4 | 2019 | 4 | 2019 |
| Test & Evaluation Milestones: Developmental/Functional Testing: Developmental/ Functional Testing Release 3.0.21 | 4 | 2020 | 4 | 2020 |
| Test & Evaluation Milestones: Developmental/Functional Testing: Developmental/ Functional Testing Release 3.0.22 | 4 | 2021 | 4 | 2021 |
| Test & Evaluation Milestones: Developmental/Functional Testing: Developmental/ Functional Testing Release 3.0.23 | 4 | 2022 | 4 | 2022 |
| Test & Evaluation Milestones: Developmental/Functional Testing: Developmental/ Functional Testing Release 3.0.24 | 4 | 2023 | 4 | 2023 |
| Test & Evaluation Milestones: Alpha/Beta Testing: Alpha/Beta Testing Release 3.0.18 | 4 | 2017 | 1 | 2018 |
| Test & Evaluation Milestones: Alpha/Beta Testing: Alpha/Beta Testing Release 3.0.19 | 4 | 2018 | 1 | 2019 |
| Test & Evaluation Milestones: Alpha/Beta Testing: Alpha/Beta Testing Release 3.0.20 | 4 | 2019 | 1 | 2020 |
| Test & Evaluation Milestones: Alpha/Beta Testing: Alpha/Beta Testing Release 3.0.21 | 4 | 2020 | 1 | 2021 |
| Test & Evaluation Milestones: Alpha/Beta Testing: Alpha/Beta Testing Release 3.0.22 | 4 | 2021 | 1 | 2022 |
| Test & Evaluation Milestones: Alpha/Beta Testing: Alpha/Beta Testing Release 3.0.23 | 4 | 2022 | 1 | 2023 |
| Test & Evaluation Milestones: Alpha/Beta Testing: Alpha/Beta Testing Release 3.0.24 | 4 | 2023 | 4 | 2023 |
| Deliveries: Engineering Change Package: Engineering Change Package Release 3.0.17 | 2 | 2017 | 2 | 2017 |
| Deliveries: Engineering Change Package: Engineering Change Package Release 3.0.18 | 2 | 2018 | 2 | 2018 |
| Deliveries: Engineering Change Package: Engineering Change Package Release 3.0.19 | 2 | 2019 | 2 | 2019 |
| Deliveries: Engineering Change Package: Engineering Change Package Release 3.0.20 | 2 | 2020 | 2 | 2020 |
| Deliveries: Engineering Change Package: Engineering Change Package Release 3.0.21 | 2 | 2021 | 2 | 2021 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603739N / *Navy Logistic Productivity* | **Project (Number/Name)**<br>2955 / *JEDMICS* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Deliveries: Engineering Change Package: Engineering Change Package Release 3.0.22 | 2 | 2022 | 2 | 2022 |
| Deliveries: Engineering Change Package: Engineering Change Package Release 3.0.23 | 2 | 2023 | 2 | 2023 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | | | | | R-1 Program Element (Number/Name)<br>PE 0603739N / *Navy Logistic Productivity* | | | | Project (Number/Name)<br>3223 / *Logistics R&D* | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| 3223: *Logistics R&D* | 2.180 | 0.864 | 0.604 | 1.146 | - | 1.146 | 1.093 | 0.977 | 0.997 | 1.018 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Stable annual funding is required to facilitate implementation and execution of a robust, flexible Logistics R&D program that will provide the means for Naval Supply Systems Command (NAVSUP) to effectively pursue solutions to mission-related capability and technology gaps. The NAVSUP Logistics R&D program has an established infrastructure and business process for ensuring that R&D funds are applied to projects that address high priority enterprise needs established in accordance with OPNAV goals and the NAVSUP Commander's Guidance.

From a process perspective, Logistics R&D investments are governed by a NAVSUP enterprise-wide Executive Steering Group (ESG) chaired by the NAVSUP Vice Commander, and comprised of SES and Command leadership representatives. The ESG ratifies capability and technology gaps identified by all activities within the enterprise, and then assesses and prioritizes all proposed Logistics R&D initiatives in accordance with their potential for filling the established gap and generating return on investment.

The established Logistics R&D business management process has currently identified capability/technology gaps in the following general areas: 1) the need to develop formalized energy management techniques that focus on energy and resource conservation; increased energy efficiency of new and existing systems and facilities; and increased use of alternative energy products, 2) the need to modernize quality of life (QOL) services to improve overall services, offer additional desired features and reduce total ownership costs, 3) the need to assess clothing protection for the warfighter in areas of thermal/flame threats, protective footwear, and physical (hearing, vibration, etc.) clothing/accessories, 4) the need to develop logistics data access and information sharing through enhanced Graphical User Interfaces (GUI) and web-based data services, 5) the need to develop a capability that allows Integrated Logistics Support (ILS) repair and modernization tools, 6) the need to leverage breakthrough technologies to improve supply chain processing. This modest R&D investment will establish a NAVSUP Logistics R&D Program to explore additional technologies and significantly increase potential cost savings.

The FY 2018 request was reduced by -$0.351 million to account for the availability of prior year execution balances.

| **B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** |
|---|---|---|---|---|---|
| ***Title:*** Effective Food Service Management | 0.000 | 0.000 | 0.185 | 0.000 | 0.185 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Food Service Management programs and services lack automation and technology which creates inefficiencies and a lack of easy access to the comprehensive information and training required for making informed management decisions impacting both the execution of supporting business processes and providing service to the customer. Capabilities that increase automation of food service business processes, administrative | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603739N / *Navy Logistic Productivity* | **Project (Number/Name)**<br>3223 / *Logistics R&D* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| requirements, and training. Technologies that automate and incorporate food science initiatives, improve menu production and selections, implement new food service concepts, and improve customers' dining experience including increasing nutritional knowledge and how it factors into overall human performance.<br><br>***FY 2018 Plans:***<br>N/A<br><br>***FY 2019 Base Plans:***<br>New focus effort for food service and ashore/afloat galley management in support of reduced manpower requirements. Develop automated solutions for food service processes to improve operations and increase Sailor knowledge of nutrition awareness, and human performance.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>The funding increase from FY 2018 to FY 2019 supports developing effective Food Service Management (FSM) automated solutions to improve FSM operations and human performance, and increase Sailor nutrition awareness knowledge. | | | | | |
| ***Title:*** Quality of Life Services Modernization & Cost Reduction (Initiative 1)<br>***Articles:***<br><br>***Description:*** NAVSUP Quality of Life (QOL) services include subsistence in kind (SIK) food service, retail, postal, laundry, vending, barber shop, household goods and disbursing/Navy Cash, are in many cases inefficient, costly to operate, and lack easy access to the comprehensive information required to make informed management decisions impacting execution of routine supporting business processes. QOL services aims to leverage new technology which will improve support information systems, security, health, etc., and reduce total ownership costs. NAVSUP owns the Food Service Program for the Navy as part of logistics and quality of life programs and is responsible for managing the overall policy including training, food safety, and implementation of "Go for Green" program for the Navy. "Go for Green" is a DoD program that promotes healthful food and beverage choices in order to optimize the performance, readiness, and health of our service members. Future funding may include projects such as new platforms being developed to focus on human performance, physical training and nutrition applications that will be integrated with the "Go for Green" DoD effort.<br><br>***FY 2018 Plans:*** | 0.000<br>- | 0.000<br>- | 0.250<br>- | 0.000<br>- | 0.250<br>- |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603739N / *Navy Logistic Productivity* | **Project (Number/Name)**<br>3223 / *Logistics R&D* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A<br><br>***FY 2019 Base Plans:***<br>Leverage Augmented Reality (AR) technology to develop state of the art training modules for Navy Regional Mail Centers (NRMCs) in Norfolk and San Diego which will provide AR training of postal functions that can significantly lower Navy Service-Wide Transportation costs, provide better customer service to shipboard and ashore customers, reduce postal offenses, decrease number of postal inquiries on tracking mail, and improve the Navy's overall corporate knowledge through dramatically improved training.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>The funding increase from FY 2018 to FY 2019 supports leveraging Augmented Reality (AR) technology to develop state of the art postal functions training modules for Navy Regional Mail Centers (NRMCs) in Norfolk and San Diego. These training modules can significantly lower Navy Service-Wide Transportation costs, provide better customer service to shipboard and ashore customers, reduce postal offenses, decrease number of postal inquiries on tracking mail, and improve the Navy's overall corporate knowledge through dramatically improved training. | | | | | |
| ***Title:*** Quality of Life Services Modernization & Cost Reduction (Initiative 2) | 0.000 | 0.275 | 0.250 | 0.000 | 0.250 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** NAVSUP Quality of Life (QOL) services include subsistence in kind (SIK) food service, retail, postal, laundry, vending, barber shop, household goods and disbursing/Navy Cash, are in many cases inefficient, costly to operate, and lack easy access to the comprehensive information required to make informed management decisions impacting execution of routine supporting business processes. QOL services aims to leverage new technology which will improve support information systems, security, health, etc., and reduce total ownership costs. NAVSUP owns the Food Service Program for the Navy as part of logistics and quality of life programs and is responsible for managing the overall policy including training, food safety, and implementation of "Go for Green" program for the Navy. "Go for Green" is a DoD program that promotes healthful food and beverage choices in order to optimize the performance, readiness, and health of our service members. Future funding may include projects such as new platforms being developed to focus on human performance, physical training and nutrition applications that will be integrated with the "Go for Green" DoD effort.<br><br>***FY 2018 Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603739N / *Navy Logistic Productivity* | **Project (Number/Name)**<br>3223 / *Logistics R&D* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Enhancing data integration of substance, retail, postal, laundry, vending, barbershop, household, goods to offer additional desired features (such as those which would improve supporting information systems, security, health, etc., and reduce total ownership costs.<br>***FY 2019 Base Plans:***<br>Leveraging new technology, we will continue to develop key educational tools to provide the sailors and their families with healthy lifestyles. Conduct complete Amphibious Ready Group (ARG) and Carrier Strike Group (CSG) predeployment briefs and training.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>There is no significant change from FY 2018 to FY 2019. | | | | | |
| ***Title:*** Readiness through Logistics Solutions | 0.600 | 0.128 | 0.268 | 0.000 | 0.268 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Supply chain improvements are required to support logistics efficiency and Fleet readiness through logistics solutions technological improvements. Develop technological capabilities that improve Naval Logistics in part or in its record (from manufacture, storage, delivery, use, maintenance, and disposal).<br>***FY 2018 Plans:***<br>Finalize Sea Service Deployment Module (SSDM) functionality.<br>***FY 2019 Base Plans:***<br>Application of Next Generation Radio Frequency Identification (RFID) technology in support of Naval Supply Chain Management. Integration of multiple emerging RFID technologies lend themselves to supporting ongoing efforts throughout both the NAVSUP Enterprise and the DON in the following areas: improved Inventory Accuracy (IA) and Asset Visibility (AV), Financial Improvement Audit Readiness (FIAR) support, increased readiness through asset health monitoring, asset movement to alert on possible diversion/counterfeiting risks. The resultant capability will be implemented in a near real time location system (RTLS) manner that provides initial operational test (item temperature, vibration, shock, flow rate, use event/metric) information in conjunction with item movement details while utilizing mesh communications to collect data without needing to implement an expensive infrastructure.<br>***FY 2019 OCO Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603739N / *Navy Logistic Productivity* | **Project (Number/Name)**<br>3223 / *Logistics R&D* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>The funding increase from FY 2018 to FY 2019 supports the Application of Next Generation Radio Frequency Identification (RFID) technology in support of Naval Supply Chain Management. Next Generation RFID technologies will improve Inventory Accuracy (IA), Asset Visibility (AV), and Financial Improvement Audit Readiness (FIAR) support, and increase readiness through asset health monitoring and asset movement alerts on possible diversion/counterfeiting risks. | | | | | |
| ***Title:*** Clothing Protection for the Warfighter<br>***Articles:***<br><br>***Description:*** Uniforms/protective clothing do not provide comfortable and/or adequate protection for the Warfighter in threat areas such as, thermal/flame, adverse environmental conditions (e.g., heat, cold, rain/snow, water immersion), hazardous chemicals, and physical trauma (hearing, vibration, blunt force, etc.). Further, the physical properties of current uniform items need improvement in the areas of color retention (e.g., reduce fading) and comfort (e.g., reduce weight and optimize moisture management while minimizing care).<br><br>***FY 2018 Plans:***<br>Identify challenges to effectively manage durability and safety aspects of common work/combat uniforms for the warfighter. Eliminate risk of potential hazardous such as fire, weather, and general wear/tear to maximize readiness and strength in Fleet uniforms. Assist with rollout of the Navy's Type III uniform.<br><br>***FY 2019 Base Plans:***<br>Leverage opportunities to work joint criteria with sister-services to collect data that will address the deficiencies of current organizational clothing and improve materials and construction methods and design.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>There is no significant change from FY 2018 to FY 2019. | 0.264<br>- | 0.201<br>- | 0.193<br>- | 0.000<br>- | 0.193<br>- |
| **Accomplishments/Planned Programs Subtotals** | 0.864 | 0.604 | 1.146 | 0.000 | 1.146 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603739N / *Navy Logistic Productivity* | **Project (Number/Name)**<br>3223 / *Logistics R&D* |

**C. Other Program Funding Summary ($ in Millions)**

**Remarks**

**D. Acquisition Strategy**

NAVSUP R&D executed through firm fixed price negotiated contracts and NAVSUP support. Performance-based reviews conducted quarterly by the Project Management Office.

**E. Performance Metrics**

Development of capability and technology gaps initiatives are monitored quarterly by the NAVSUP R&D Program Management Office.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603739N / *Navy Logistic Productivity* | Project (Number/Name)<br>3223 / *Logistics R&D* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Effective Food Service Management | C/FFP | Various : Various | 0.000 | 0.000 | | 0.000 | | 0.185 | Dec 2018 | - | | 0.185 | Continuing | Continuing | Continuing |
| Quality of Life Services Modernization & Cost Reduction (Initiative 1) | C/FFP | BSC : Mechanicsburg, PA | 0.259 | 0.000 | | 0.000 | | 0.250 | Jan 2019 | - | | 0.250 | Continuing | Continuing | Continuing |
| Quality of Life Services Modernization & Cost Reduction (Initiative 2) | C/FFP | Various : Various | 0.785 | 0.000 | | 0.275 | Jan 2018 | 0.250 | Nov 2018 | - | | 0.250 | Continuing | Continuing | Continuing |
| Readiness through Logistics Solutions | C/FFP | SSDM : Scott AFB, IL | 0.475 | 0.600 | May 2017 | 0.128 | Dec 2017 | 0.268 | Dec 2018 | - | | 0.268 | Continuing | Continuing | Continuing |
| Clothing Protection for the Warfighter | C/FFP | NCTRF : Natick,MA | 0.661 | 0.264 | Mar 2017 | 0.201 | Dec 2017 | 0.193 | Dec 2018 | - | | 0.193 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 2.180 | 0.864 | | 0.604 | | 1.146 | | - | | 1.146 | Continuing | Continuing | N/A |

**Remarks**

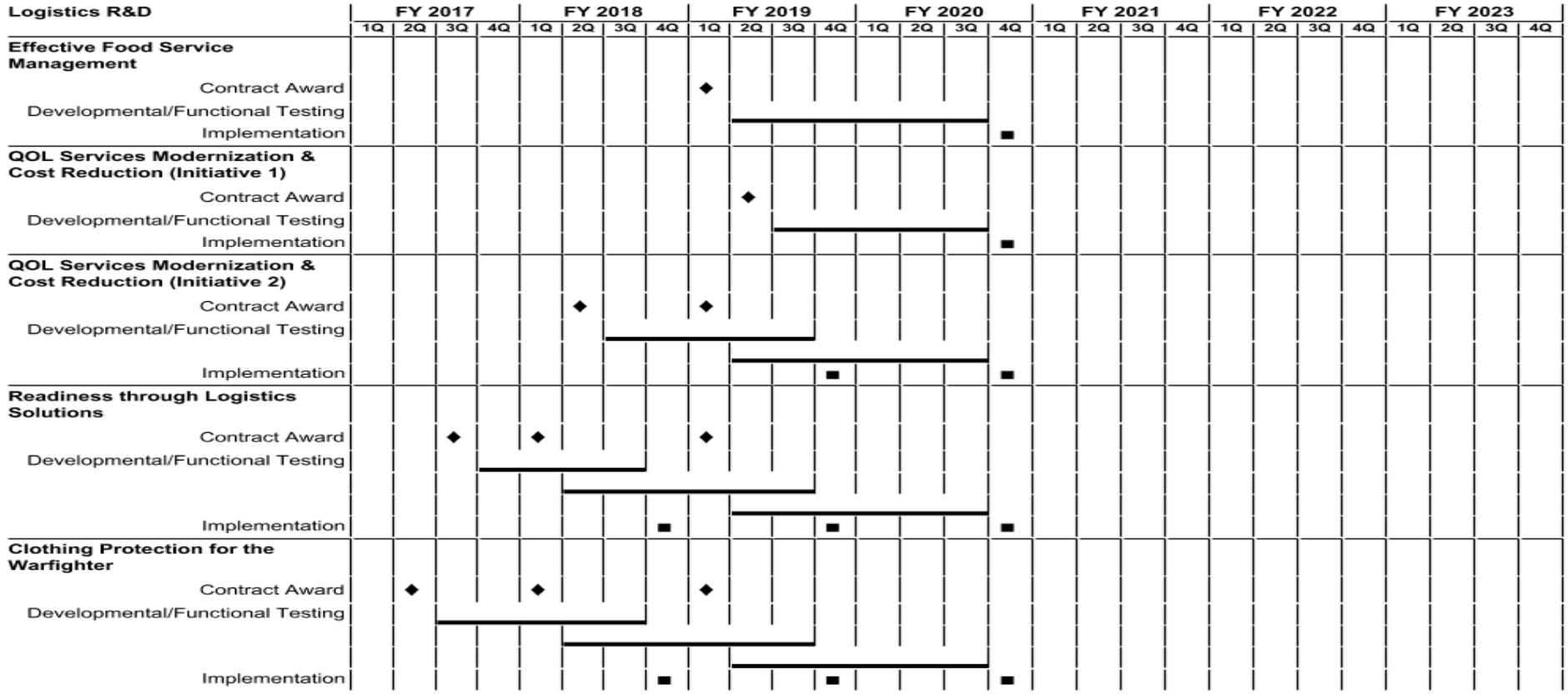
NLP funding of $864K was dispersed through the following projects: Black Safety Boot, Cold/Wet Weather Clothing Ensemble, these projects will conduct comprehensive research, testing, and evaluations to provide solid result of improvements needed to sustain the Fleet uniform initiatives. Sea Service Deployment Module will modernize a unit move information technology system to facilitate FY15 JROCM mandates, pending IA certification requirements as well as (Naval) forces required use of the force deployment planning and execution business procedures.

| | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 2.180 | 0.864 | | 0.604 | | 1.146 | | - | | 1.146 | Continuing | Continuing | N/A |

**Remarks**

In previous plans, NAVSUP forecast budget requirements based on projections rooted in the current year's capability gaps. As our priorities and Strategic Guidance evolves so does our budget requirements. Through leveraging new technologies, NAVSUP will enhance efforts for supply ashore and distant support. We will strengthen our supply chain information technology and management solutions for supply and financial requirements. We will collaborate with partners to improve the quality-of-life experiences and expand services to deployed forces. NAVSUP will continue to build an ethical and effective workforce dedicated to the mission by developing new technological programs that are advantageous to the warfighter. We will reduce risk and minimize vulnerabilities to protect against disruptions to supply chain and business systems. All of our actions will follow a culture of moral excellence to successfully execute the current and future missions of NAVSUP.

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603739N / *Navy Logistic Productivity* | **Project (Number/Name)**<br>3223 / *Logistics R&D* |




*2019OSD - 0603739N - 3223*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603739N / *Navy Logistic Productivity* | **Project (Number/Name)**<br>3223 / *Logistics R&D* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Logistics R&D*** | | | | |
| Effective Food Service Management: Contract Award: FY 2019 Contract Award | 1 | 2019 | 1 | 2019 |
| Effective Food Service Management: Developmental/Functional Testing: Developmental/Functional Testing | 2 | 2019 | 3 | 2020 |
| Effective Food Service Management: Implementation: Implementation | 4 | 2020 | 4 | 2020 |
| QOL Services Modernization & Cost Reduction (Initiative 1): Contract Award: FY 2019 Contract Award | 2 | 2019 | 2 | 2019 |
| QOL Services Modernization & Cost Reduction (Initiative 1): Developmental/Functional Testing: Developmental/Functional Testing | 3 | 2019 | 3 | 2020 |
| QOL Services Modernization & Cost Reduction (Initiative 1): Implementation: Implementation | 4 | 2020 | 4 | 2020 |
| QOL Services Modernization & Cost Reduction (Initiative 2): Contract Award: FY 2018 Contract Award | 2 | 2018 | 2 | 2018 |
| QOL Services Modernization & Cost Reduction (Initiative 2): Contract Award: FY 2019 Contract Award | 1 | 2019 | 1 | 2019 |
| QOL Services Modernization & Cost Reduction (Initiative 2): Developmental/Functional Testing: FY 2018 Developmental/Functional Testing | 3 | 2018 | 3 | 2019 |
| QOL Services Modernization & Cost Reduction (Initiative 2): Developmental/Functional Testing: FY 2019 Developmental/Functional Testing | 2 | 2019 | 3 | 2020 |
| QOL Services Modernization & Cost Reduction (Initiative 2): Implementation: FY 2018 Implementation | 4 | 2019 | 4 | 2019 |
| QOL Services Modernization & Cost Reduction (Initiative 2): Implementation: FY 2019 Implementation | 4 | 2020 | 4 | 2020 |
| Readiness through Logistics Solutions: Contract Award: FY 2017 Contract Award | 3 | 2017 | 3 | 2017 |
| Readiness through Logistics Solutions: Contract Award: FY 2018 Contract Award | 1 | 2018 | 1 | 2018 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603739N / *Navy Logistic Productivity* | **Project (Number/Name)**<br>3223 / *Logistics R&D* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Readiness through Logistics Solutions: Contract Award: FY 2019 Contract Award | 1 | 2019 | 1 | 2019 |
| Readiness through Logistics Solutions: Developmental/Functional Testing: FY 2017 Developmental/Functional Testing | 4 | 2017 | 3 | 2018 |
| Readiness through Logistics Solutions: Developmental/Functional Testing: FY 2018 Developmental/Functional Testing | 2 | 2018 | 3 | 2019 |
| Readiness through Logistics Solutions: Developmental/Functional Testing: FY 2019 Developmental/Functional Testing | 2 | 2019 | 3 | 2020 |
| Readiness through Logistics Solutions: Implementation: FY 2017 Implementation | 4 | 2018 | 4 | 2018 |
| Readiness through Logistics Solutions: Implementation: FY 2018 Implementation | 4 | 2019 | 4 | 2019 |
| Readiness through Logistics Solutions: Implementation: FY 2019 Implementation | 4 | 2020 | 4 | 2020 |
| Clothing Protection for the Warfighter: Contract Award: FY 2017 Contract Award | 2 | 2017 | 2 | 2017 |
| Clothing Protection for the Warfighter: Contract Award: FY 2018 Contract Award | 1 | 2018 | 1 | 2018 |
| Clothing Protection for the Warfighter: Contract Award: FY 2019 Contract Award | 1 | 2019 | 1 | 2019 |
| Clothing Protection for the Warfighter: Developmental/Functional Testing: FY 2017 Developmental/Functional Testing | 3 | 2017 | 3 | 2018 |
| Clothing Protection for the Warfighter: Developmental/Functional Testing: FY 2018 Developmental/Functional Testing | 2 | 2018 | 3 | 2019 |
| Clothing Protection for the Warfighter: Developmental/Functional Testing: FY 2019 Developmental/Functional Testing | 2 | 2019 | 3 | 2020 |
| Clothing Protection for the Warfighter: Implementation: FY 2017 Implementation | 4 | 2018 | 4 | 2018 |
| Clothing Protection for the Warfighter: Implementation: FY 2018 Implementation | 4 | 2019 | 4 | 2019 |
| Clothing Protection for the Warfighter: Implementation: FY 2019 Implementation | 4 | 2020 | 4 | 2020 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603746N *I (U)RETRACT MAPLE* |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Program Element | 0.000 | 301.871 | 306.101 | 377.878 | - | 377.878 | 115.281 | 88.123 | 78.875 | 80.757 | Continuing | Continuing |
| 1906: *Retract Maple* | 0.000 | 301.871 | 306.101 | 377.878 | - | 377.878 | 115.281 | 88.123 | 78.875 | 80.757 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

This program is reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 323.526 | 306.101 | 153.613 | - | 153.613 |
| Current President's Budget | 301.871 | 306.101 | 377.878 | - | 377.878 |
| Total Adjustments | -21.655 | 0.000 | 224.265 | - | 224.265 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | -3.200 | 0.000 | | | |
| • SBIR/STTR Transfer | -9.488 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | 75.651 | - | 75.651 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | 148.614 | - | 148.614 |
| • Congressional General Reductions Adjustments | -0.217 | - | - | - | - |
| • Congressional Directed Reductions Adjustments | -8.750 | - | - | - | - |

**Change Summary Explanation**

Technical: Not applicable.

Schedule: Not applicable.

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603748N *I (U)LINK PLUMERIA* |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Program Element | 0.000 | 259.756 | 253.675 | 381.770 | - | 381.770 | 370.813 | 330.228 | 254.906 | 236.078 | Continuing | Continuing |
| 1978: *Link Plumeria* | 0.000 | 259.756 | 253.675 | 381.770 | - | 381.770 | 370.813 | 330.228 | 254.906 | 236.078 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

This program is reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 318.497 | 253.675 | 334.760 | - | 334.760 |
| Current President's Budget | 259.756 | 253.675 | 381.770 | - | 381.770 |
| Total Adjustments | -58.741 | 0.000 | 47.010 | - | 47.010 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | -14.100 | 0.000 | | | |
| • SBIR/STTR Transfer | -10.435 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | 1.388 | - | 1.388 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | 45.622 | - | 45.622 |
| • Congressional General Reductions Adjustments | -0.006 | - | - | - | - |
| • Congressional Directed Reductions Adjustments | -34.200 | - | - | - | - |

**Change Summary Explanation**

Technical: Not applicable.

Schedule: Not applicable.

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603751N *I (U)RETRACT ELM* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 0.000 | 51.720 | 55.691 | 60.535 | - | 60.535 | 61.189 | 55.980 | 53.777 | 53.964 | Continuing | Continuing |
| 2003: *Retract Elm* | 0.000 | 51.720 | 55.691 | 60.535 | - | 60.535 | 61.189 | 55.980 | 53.777 | 53.964 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

This program is reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 52.834 | 55.691 | 56.630 | - | 56.630 |
| Current President's Budget | 51.720 | 55.691 | 60.535 | - | 60.535 |
| Total Adjustments | -1.114 | 0.000 | 3.905 | - | 3.905 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | 1.200 | 0.000 | | | |
| • SBIR/STTR Transfer | -2.002 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | 6.000 | - | 6.000 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -2.095 | - | -2.095 |
| • Congressional General Reductions Adjustments | -0.312 | - | - | - | - |

**Change Summary Explanation**

Technical: Not applicable.
Schedule: Not applicable.

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603764N *I (U)LINK EVERGREEN* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 0.000 | 46.282 | 48.982 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 95.264 |
| 1972: *Link Evergreen* | 0.000 | 46.282 | 48.982 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 95.264 |

**A. Mission Description and Budget Item Justification**

This program is reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 48.116 | 48.982 | 0.000 | - | 0.000 |
| Current President's Budget | 46.282 | 48.982 | 0.000 | - | 0.000 |
| Total Adjustments | -1.834 | 0.000 | 0.000 | - | 0.000 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -1.834 | 0.000 | | | |
| • Rate/Misc Adjustments | 0.000 | 0.000 | 0.000 | - | 0.000 |

**Change Summary Explanation**

Technical: Not applicable.

Schedule: Not applicable.

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603787N *I (U)SPECIAL PROCESSES* |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Program Element | 0.000 | 13.088 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 13.088 |
| 0116: *Linear Tank* | 0.000 | 13.088 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 13.088 |

**A. Mission Description and Budget Item Justification**

This program is reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 13.619 | 0.000 | 0.000 | - | 0.000 |
| Current President's Budget | 13.088 | 0.000 | 0.000 | - | 0.000 |
| Total Adjustments | -0.531 | 0.000 | 0.000 | - | 0.000 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -0.516 | 0.000 | | | |
| • Rate/Misc Adjustments | 0.000 | 0.000 | 0.000 | - | 0.000 |
| • Congressional General Reductions Adjustments | -0.015 | - | - | - | - |

**Change Summary Explanation**

Technical: Not applicable.
Schedule: Not applicable.

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603790N *I NATO Research and Deve* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 72.587 | 8.567 | 9.099 | 9.652 | - | 9.652 | 11.121 | 10.741 | 10.314 | 10.528 | Continuing | Continuing |
| 2293: *NATO Cooperative R & D* | 72.587 | 8.567 | 9.099 | 9.652 | - | 9.652 | 11.121 | 10.741 | 10.314 | 10.528 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

In accordance with Title 10 United States Code, Section 2350a, this Program Element (PE) provides funding for research and development (R&D) programs with approved allies under international agreements. These funds can only be applied to work efforts in the U.S.. The Under Secretary of Defense, Acquisition and Technology and Logistics (USD, AT&L) must approve each international agreement. The program provides funds for multiple projects under separately approved international agreements as well as funds that support the establishment of such agreements. Each international agreement is summarized in a separate Summary Statement of Intent (SSOI) that also states why the project serves to increase the defense capabilities of the U.S. The SSOI is used to obtain project approval by the Department of the Navy and the Office of the Secretary of Defense.

The North Atlantic Treaty Organization (NATO) R&D cooperative programs differ from other Research, Development, Test and Evaluation (RDT&E) programs because issuance of funding from this PE coincides with the signature of international agreements. These signatures occur throughout the fiscal year and often encounter unexpected delays during the staffing and negotiation phases of agreement processing prior to signature.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 9.867 | 9.099 | 10.772 | - | 10.772 |
| Current President's Budget | 8.567 | 9.099 | 9.652 | - | 9.652 |
| Total Adjustments | -1.300 | 0.000 | -1.120 | - | -1.120 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | - | - | | | |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -1.120 | - | -1.120 |
| • Congressional Directed Reductions Adjustments | -1.300 | - | - | - | - |

**Change Summary Explanation**

The FY 2019 funding request was reduced by $0.977 million to account for the availability of prior year execution balances.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603790N / *NATO Research and Deve* | Project (Number/Name)<br>2293 / *NATO Cooperative R & D* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2293: *NATO Cooperative R & D* | 72.587 | 8.567 | 9.099 | 9.652 | - | 9.652 | 11.121 | 10.741 | 10.314 | 10.528 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

In accordance with Title 10 United States Code, Section 2350a, this Program Element (PE) provides funding for research and development (R&D) programs with approved allies under international agreements. These funds can only be applied to work efforts in the U.S.. The Under Secretary of Defense, Acquisition and Technology and Logistics (USD, AT&L) must approve each international agreement. The program provides funds for multiple projects under separately approved international agreements as well as funds to support the establishment of such agreements. Each international agreement is summarized in a separate Summary Statement of Intent (SSOI) that states how the project serves to increase the defense capabilities of the U.S. The SSOI is used to obtain project approval by the Department of the Navy and the Office of the Secretary of Defense.

North Atlantic Treaty Organization (NATO) R&D cooperative programs differ from other Research, Development, Test and Evaluation (RDT&E) programs because issuance of funding from this PE coincides with the signature of international agreements. These signatures occur throughout the fiscal year and often encounter unexpected delays during the staffing and negotiation phases of agreement processing prior to signature

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** NATO Cooperative R & D | 8.567 | 9.099 | 9.652 | 0.000 | 9.652 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>-Continue to support approved Cooperative projects signed in prior Fiscal Years.<br>-Plan and support approved FY2018 Cooperative projects.<br><br>Projects include, but are not limited to:<br>-Advanced Surveillance Technology (AST) U.S. and Australia<br>-Allied Munitions Detection-Underwater Initiative (ALMOND-U) U.S. and Germany<br>-Arctic Hydrodynamics U.S. and Finland<br>-Autonomous Maritime Asset Protection Systems (AMAPS) U.S. and United Kingdom<br>-Biomimetic Threat Detection System (BTDS) U.S. and United Kingdom<br>-Coalition Underwater Mine and IED Defeat (CUMID) U.S., Canada, and Norway<br>-Collaborative Situational Awareness Development (CSA DEV) U.S. and Italy<br>-Digital Wideband Receiver Signals Intelligence (DWR-SIGINT) U.S. and Australia | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603790N / *NATO Research and Deve* | **Project (Number/Name)**<br>2293 / *NATO Cooperative R & D* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| -Dynamic System Mechanics Advanced Simulation-Shallow Confined Waters (DYSMAS-SCW) U.S. and Germany<br>-Electromagnetic Silencing U.S. and United Kingdom<br>-Helo Seat Damper U.S. and Canada<br>-Hull Treatments U.S. and United Kingdom<br>-International Programs Opportunities Engagement Tool (iPoet)<br>-Japan U.S. Amphibious Vehicle Technology Cooperation (JUSAV) U.S. and Japan<br>-Optical Materials Amendment 1 U.S. and Israel<br>-Submarine Superiority U.S. and Australia<br>-Superconducting Quantum Small Electromagnetic Sensor System Research and Development (Super QSES) U.S. and Australia<br>-Ultra Heavy Lift Amphibious Connector (UHAC) U.S. and Singapore<br>-Undersea Surveillance and Communications (USC) U.S. and Sweden | | | | | |
| ***FY 2019 Base Plans:***<br>-Continue to support approved Cooperative projects signed in prior fiscal years.<br>-Plan and support approved FY2019 Cooperative projects.<br><br>Potential Projects include, but are not limited to:<br>-Advanced Structural Monitoring Techniques (ASMT) U.S. and Australia<br>-Advanced Surveillance Technology (AST) U.S. and Australia<br>-Allied Munitions Detection-Underwater Initiative (ALMOND-U) U.S. and Germany<br>-Arctic Hydrodynamics U.S. and Finland<br>-Autonomous Maritime Asset Protection Systems (AMAPS) U.S. and United Kingdom<br>-Biomimetic Threat Detection System (BTDS) U.S. and United Kingdom<br>-Coalition Underwater Mine and IED Defeat (CUMID) U.S., Canada, and Norway<br>-Collaborative Situational Awareness Development (CSA DEV) U.S. and Italy<br>-Dynamic System Mechanics Advanced Simulation-Shallow Confined Waters (DYSMAS-SCW) U.S. and Germany<br>-Electromagnetic Silencing U.S. and United Kingdom<br>-Helo Seat Damper U.S. and Canada<br>-Hull Treatments U.S. and United Kingdom<br>-International Programs Opportunities Engagement Tool (iPoet)<br>-Japan U.S. Amphibious Vehicle Technology Cooperation (JUSAV) U.S. and Japan | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603790N / *NATO Research and Deve* | **Project (Number/Name)**<br>2293 / *NATO Cooperative R & D* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| -Optical Materials Amendment 1 U.S. and Israel<br>-Submarine Superiority U.S. and Australia<br>-Superconducting Quantum Small Electromagnetic Sensor System Research and Development (Super QSES) U.S. and Australia<br>-Ultra Heavy Lift Amphibious Connector (UHAC) U.S. and Singapore<br>-Undersea Surveillance and Communications (USC) U.S. and Sweden<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Prj. 2293 NUNN has taken several marks for under execution, as a result the program has been promised the funds put back in the FY18 and FY19 | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 8.567 | 9.099 | 9.652 | 0.000 | 9.652 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

**E. Performance Metrics**

The intent of the North Atlantic Treaty Organization (NATO) cooperative R&D program is to provide initial funds for projects seeking allied contributions into cooperative research and development projects with the U.S. The primary metric used in the program is foreign contributions into projects supported by the program. The performance goal is met if total foreign contributions into projects exceed total NATO cooperative R&D program funds by over 100%.

This program historically does not meet established execution benchmarks. The North Atlantic Treaty Organization (NATO) R&D cooperative programs differ from other Research, Development, Test and Evaluation (RDT&E) programs because issuance of funding from this PE coincides with the signature of international agreements. These signatures occur throughout the fiscal year and often encounter unexpected delays during the staffing and negotiation phases of agreement processing prior to signature.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603790N / *NATO Research and Deve* | Project (Number/Name)<br>2293 / *NATO Cooperative R & D* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Developmental Test and Evaluation | C/FP | NAVSEA : Washington Navy Yard, DC | 26.126 | 0.500 | Jan 2017 | 0.250 | Apr 2018 | 0.669 | Dec 2018 | - | | 0.669 | Continuing | Continuing | Continuing |
| Developmental Test and Evaluation | C/FP | NSWC : West Bethesda, MD | 13.621 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Developmental Test and Evaluation | C/FP | NUWC : Newport, RI | 2.352 | 0.000 | | 0.525 | Dec 2017 | 0.300 | Dec 2018 | - | | 0.300 | Continuing | Continuing | Continuing |
| Developmental Test and Evaluation | C/FP | SPAWAR : San Diego, CA | 4.853 | 0.500 | Dec 2016 | 0.818 | Apr 2018 | 1.000 | Jan 2019 | - | | 1.000 | Continuing | Continuing | Continuing |
| Developmental Test and Evaluation | C/FP | NAVAIR : Patuxent River, MD | 2.136 | 0.000 | | 2.004 | Dec 2017 | 0.353 | Dec 2018 | - | | 0.353 | Continuing | Continuing | Continuing |
| Developmental Test and Evaluation | C/FP | NRL : Washington, DC | 2.484 | 0.000 | | 1.512 | Oct 2017 | 1.830 | Nov 2018 | - | | 1.830 | Continuing | Continuing | Continuing |
| Developmental Test and Evaluation | C/FP | NAWC : Point Mugu, CA | 6.100 | 1.000 | Jan 2017 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Developmental Test and Evaluation | C/FP | Miscellaneous : Washington Navy Yard | 9.531 | 6.192 | Apr 2017 | 1.170 | Mar 2018 | 1.500 | Apr 2019 | - | | 1.500 | Continuing | Continuing | Continuing |
| Deveiopmental Test and Evaulation | C/FP | MARCOR : Washington.DC | 1.200 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.200 | - |
| Developmental Test and Evaulation | C/FP | NSWCCD : Carderock, MD | 2.035 | 0.000 | | 0.900 | May 2018 | 0.625 | Apr 2019 | - | | 0.625 | 0.000 | 3.560 | - |
| Developmental Test and Evaulation | C/FP | ONR : Arlington, VA | 2.100 | 0.375 | May 2017 | 0.000 | | 0.775 | Mar 2019 | - | | 0.775 | 0.000 | 3.250 | - |
| Developmental Test and Evaluation | C/FP | USMC : Qunatic VA | 0.000 | 0.000 | | 0.000 | | 0.500 | May 2019 | - | | 0.500 | 0.000 | 0.500 | - |
| Developmental Test and Evaulation | C/FP | NSWC : Indian Head, MD | 0.000 | 0.000 | | 0.250 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.250 | - |
| Developmental Test and Evaulation | C/FP | NSWC : Panama City , FL | 0.000 | 0.000 | | 0.250 | Dec 2017 | 0.200 | Oct 2018 | - | | 0.200 | 0.000 | 0.450 | - |
| Developmental Test and Evaulation | C/FP | GSA : Washington, DC | 0.000 | 0.000 | | 0.400 | Feb 2018 | 0.400 | Mar 2019 | - | | 0.400 | 0.000 | 0.800 | - |
| Developmental Test and Evaulation | C/FP | DISA : Ft Meade MD | 0.000 | 0.000 | | 0.000 | | 1.500 | Dec 2018 | - | | 1.500 | 0.000 | 1.500 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603790N / *NATO Research and Deve* | Project (Number/Name)<br>2293 / *NATO Cooperative R & D* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Developmental Test and Evaulation | C/FP | CDSA : Dam Neck, VA | 0.000 | 0.000 | | 1.020 | Mar 2018 | 0.000 | | - | | 0.000 | 0.000 | 1.020 | - |
| | | **Subtotal** | 72.538 | 8.567 | | 9.099 | | 9.652 | | - | | 9.652 | Continuing | Continuing | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ACQ Workforce Fund | Various | Various : Various | 0.049 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.049 | - |
| | | **Subtotal** | 0.049 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.049 | N/A |

| | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 72.587 | 8.567 | | 9.099 | | 9.652 | | - | | 9.652 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603790N / *NATO Research and Deve* | **Project (Number/Name)**<br>2293 / *NATO Cooperative R & D* |

| | FY 2017 | | | | FY 2018 | | | | FY 2019 | | | | FY 2020 | | | | FY 2021 | | | | FY 2022 | | | | FY 2023 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| ***Proj 2293*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| International Agreements | [redacted] | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603790N / *NATO Research and Deve* | **Project (Number/Name)**<br>2293 / *NATO Cooperative R & D* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 2293*** | | | | |
| International Agreements | 1 | 2017 | 4 | 2017 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603795N *I Land Attack Tech* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 15.471 | 17.260 | 35.668 | 15.529 | 1.400 | 16.929 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 85.328 |
| 2020: *Advanced Gun System Projectile* | 0.000 | 0.000 | 18.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 18.000 |
| 2038: *ADVANCED MINOR CALIBER GUN* | 15.471 | 1.073 | 2.100 | 0.000 | 1.400 | 1.400 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 20.044 |
| 3370: *Railgun* | 0.000 | 4.581 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 4.581 |
| 3401: *Guided Projectile* | 0.000 | 0.000 | 15.568 | 15.529 | - | 15.529 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 31.097 |
| 9999: *Congressional Adds* | 0.000 | 11.606 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 11.606 |

**A. Mission Description and Budget Item Justification**

Project 2020: The Advanced Gun System (AGS) projectile will provide Naval Surface Fires support for DDG 1000 class destroyers from the MK-51 Gun Weapon System (GWS). The AGS projectile will replace the Long Range Land Attack Projectile which was the original 155mm munitions developed for the MK-51 GWS. The development effort focuses on integration of a 155mm guided projectile in the MK-51 GWS which includes modifications to address initialization, dimensional, gun launch, and automated handling interface differences. Components affected by the integration of a 155mm guided projectile include the guided projectile, the propelling charge, the MK-51 Gun Weapon System, and the Total Ship Computing Environment. The program was funded under PE 0204202N DDG 1000 in FY 2017. The capability is planned for Initial Operational Capability in 4QFY2021. This is not a new start.

Project 2038: The Advanced Minor Caliber Gun supported non-recurring engineering, component integration, and testing efforts required for capability upgrades to the MK38 Mod 2, a minor caliber gun weapon system.

Project 2038 OCO: In order to respond to the Joint Urgent Operational Need (JUONs CC-0558) Counter Unmanned Aerial Systems (CUAS), the MK 38 MOD 2 Machine Gun System will be upgraded to counter these threats. Fielding is expected to start 1st quarter FY20.

Projects 3370 & 3401: The Gun Launched Guided Projectile effort will double the range of the current 5-inch conventional ammunition while meeting multi-mission operational requirements for Anti-Surface Warfare (ASuW), Anti-Air Warfare (AAW), and Naval Surface Fire Support (NSFS) missions. This project executes pre milestone (MS) B activities and begins preparations for the Engineering, Manufacturing, and Development Phase planned for FY 2020. This includes development of system specifications and interface control documents to support MS B. Maturation of subcomponents and integration risk reduction efforts will be initiated to support MS B Acquisition Milestone and Competitive E&MD Award. The Gun Launched Guided Projectile project was previously funded under the PE 0603925N / Directed Energy and Electronic Weapon Systems (Proj: 3370 Railgun) and 0603795N / Land Attack Tech (Proj: 3370 Railgun). This is not a new start.

Proj 9999: The objective is to demonstrate a 5-inch guided projectile capable of conducting Naval Surface Fire Support missions to a range of not less than 26 nautical miles (nmi). Priority consideration will be given to mature designs capable of achieving qualification for fleet introduction in the near term.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603795N *I Land Attack Tech* |

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 6.015 | 33.568 | 43.713 | - | 43.713 |
| Current President's Budget | 17.260 | 35.668 | 15.529 | 1.400 | 16.929 |
| Total Adjustments | 11.245 | 2.100 | -28.184 | 1.400 | -26.784 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | -0.300 | 0.000 | | | |
| • SBIR/STTR Transfer | -0.455 | 0.000 | | | |
| • Program Adjustments | 0.000 | 2.100 | -27.713 | - | -27.713 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -0.471 | 1.400 | 0.929 |
| • Congressional Add Adjustments | 12.000 | - | - | - | - |

| Congressional Add Details ($ in Millions, and Includes General Reductions) | FY 2017 | FY 2018 |
|---|---|---|
| **Project:** 9999: *Congressional Adds* | | |
| Congressional Add: *Fly Off Competition* | 11.606 | 0.000 |
| Congressional Add Subtotals for Project: 9999 | 11.606 | 0.000 |
| Congressional Add Totals for all Projects | 11.606 | 0.000 |

**Change Summary Explanation**

Increase of +$11.606M supports 5-inch guided projectile demonstration.

Decrease of -.800M due to BTR from project 3370 Railgun in FY17.

Decrease of -.191M due to  Efficiency reduction from project 3401 Guided Projectile in FY19.

Decrease of -$165.206M removed from project 3401 Guided Projectile through fiscal years 19-22.

Increase of $4.0M FY17($0.5M baseline), FY18 ($2.1M OCO) & FY19 ($1.4M OCO) for project 2038 Urgent Operational Need for defense against Unmanned Aerial Systems (UAS).

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603795N / *Land Attack Tech* | Project (Number/Name)<br>2020 / *Advanced Gun System Projectile* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2020: *Advanced Gun System Projectile* | 0.000 | 0.000 | 18.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 18.000 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The Advanced Gun System (AGS) projectile will provide affordable Naval Surface Fires Support for DDG 1000 class destroyers from the MK 51 Gun Weapon System (commonly referred to as AGS). Initiation of a demonstration and development planning for an affordable round was directed by Assistant Secretary of the Navy, Research, Development, and Acquisition to address the unaffordability of the Long Range Land Attack Projectile. The effort focuses on integration of an affordable 155mm guided projectile in the MK 51 GWS and includes modifications to address initialization, dimensional, gun launch, and automated handling interface differences. Components affected by the integration of an affordable 155mm guided projectile include the guided projectile, the propelling charge, the MK 51 Gun Weapon System, and the Total Ship Computing Environment. The program is funded under PE 0204202N DDG 1000 in FY 2017. Initial Operational Capability is planned for 4QFY2021.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Systems Engineering and Design Verification | 0.000 | 18.000 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Baseline Interface Control Documents<br>Baseline system specification for a 155mm guided projectile<br>Initiate modifications to the guided projectile to support interface requirements<br>Begin design on MK-51 Gun Weapon System modifications<br>Begin design verification testing on MK-51 Gun Weapon System modifications<br>Begin design verification testing for an alternate propelling charge system<br>Complete alternate logical and electrical Critical Design Review for initialization conversion<br>Complete a technology transfer to industry for the electrical and logical interface conversion<br>Initiate development on system integration modifications | | | | | |
| ***FY 2019 Base Plans:***<br>N/A | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603795N / *Land Attack Tech* | **Project (Number/Name)**<br>2020 / *Advanced Gun System Projectile* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Decrease due to Advanced Gun System not being funded past FY 2018. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 18.000 | 0.000 | 0.000 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Projectile decision based on capability, cost, technology maturity,and ability to support DDG-1000 Initial Operational Capability schedule.

**E. Performance Metrics**

Development cost, unit cost, Initial Operational Capability schedule.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603795N / *Land Attack Tech* | **Project (Number/Name)**<br>2020 / *Advanced Gun System Projectile* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Guided Projectile Modification Development | C/CPFF | TBD : Not Specified | 0.000 | 0.000 | | 3.200 | Dec 2017 | 0.000 | | - | | 0.000 | 39.502 | 42.702 | - |
| Propelling Charge Development | C/CPFF | BAE Systems : Fridley, MN | 0.000 | 0.000 | | 2.655 | Dec 2017 | 0.000 | | - | | 0.000 | 9.148 | 11.803 | - |
| Munitions Container Development | C/CPFF | BAE Systems : Fridley, MN | 0.000 | 0.000 | | 2.100 | Dec 2017 | 0.000 | | - | | 0.000 | 3.540 | 5.640 | - |
| Munition Container Modification Development, Electrical | WR | NSWC Dahlgren : Dahlgren, VA | 0.000 | 0.000 | | 0.365 | Oct 2017 | 0.000 | | - | | 0.000 | 0.200 | 0.565 | - |
| Munitions Container and Propelling Charge Technical Data Package Modification | WR | NSWC IHEODTD : Picatinny, NJ | 0.000 | 0.000 | | 0.241 | Oct 2017 | 0.000 | | - | | 0.000 | 0.246 | 0.487 | - |
| Munitions Container and Propelling Charge Technical Data Package Modification | WR | NSWC CN : Corona, CA | 0.000 | 0.000 | | 0.075 | Oct 2017 | 0.000 | | - | | 0.000 | 0.080 | 0.155 | - |
| MK 51 Munition Container Modification Development, Software | MIPR | ARDEC : Picatinny, NJ | 0.000 | 0.000 | | 0.250 | Oct 2017 | 0.000 | | - | | 0.000 | 0.100 | 0.350 | - |
| MK 51 GWS Modification Development | C/CPFF | BAE Systems : Fridley, MN | 0.000 | 0.000 | | 5.068 | Dec 2017 | 0.000 | | - | | 0.000 | 19.932 | 25.000 | - |
| Total Ship Computing Environment Modification Development | C/CPFF | Raytheon IDS : Tewksbury, MA | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 15.000 | 15.000 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 13.954 | | 0.000 | | - | | 0.000 | 87.748 | 101.702 | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Government Services Engineering | WR | NSWC Dahlgren : Dahlgren, VA | 0.000 | 0.000 | | 0.780 | Oct 2017 | 0.000 | | - | | 0.000 | 1.251 | 2.031 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603795N / *Land Attack Tech* | Project (Number/Name)<br>2020 / *Advanced Gun System Projectile* | |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Government Services Engineering | WR | NSWC IHEOTD : Indian Head MD | 0.000 | 0.000 | | 0.790 | Oct 2017 | 0.000 | | - | | 0.000 | 1.128 | 1.918 | - |
| Government Services Engineering | WR | NSWC IHEOTD : Picatinny, NJ | 0.000 | 0.000 | | 0.626 | Oct 2017 | 0.000 | | - | | 0.000 | 1.144 | 1.770 | - |
| Government Services Engineering | WR | NAWC,CL : China Lake, CA | 0.000 | 0.000 | | 0.100 | Oct 2017 | 0.000 | | - | | 0.000 | 0.181 | 0.281 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 2.296 | | 0.000 | | - | | 0.000 | 3.704 | 6.000 | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Test Analysis and Articles | MIPR | USAASC : Picatinny, NJ | 0.000 | 0.000 | | 0.500 | Oct 2017 | 0.000 | | - | | 0.000 | 4.704 | 5.204 | - |
| Test Range | MIPR | Dugway Proving Grounds : Dugway, UT | 0.000 | 0.000 | | 0.450 | Oct 2017 | 0.000 | | - | | 0.000 | 0.900 | 1.350 | - |
| Test Range | MIPR | Yuma Proving Grounds : Yuma, AZ | 0.000 | 0.000 | | 0.180 | Oct 2017 | 0.000 | | - | | 0.000 | 0.300 | 0.480 | - |
| Test Range | WR | Dahlgren Range : Dahlgren, VA | 0.000 | 0.000 | | 0.320 | Oct 2017 | 0.000 | | - | | 0.000 | 1.269 | 1.589 | - |
| Test Range | WR | White Sands Missile Range : White Sands, NM | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.900 | 0.900 | - |
| Test Range | WR | NSWC IHEODTD : Picatinny, NJ | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.575 | 0.575 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 1.450 | | 0.000 | | - | | 0.000 | 8.648 | 10.098 | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603795N / *Land Attack Tech* | Project (Number/Name)<br>2020 / *Advanced Gun System Projectile* | |

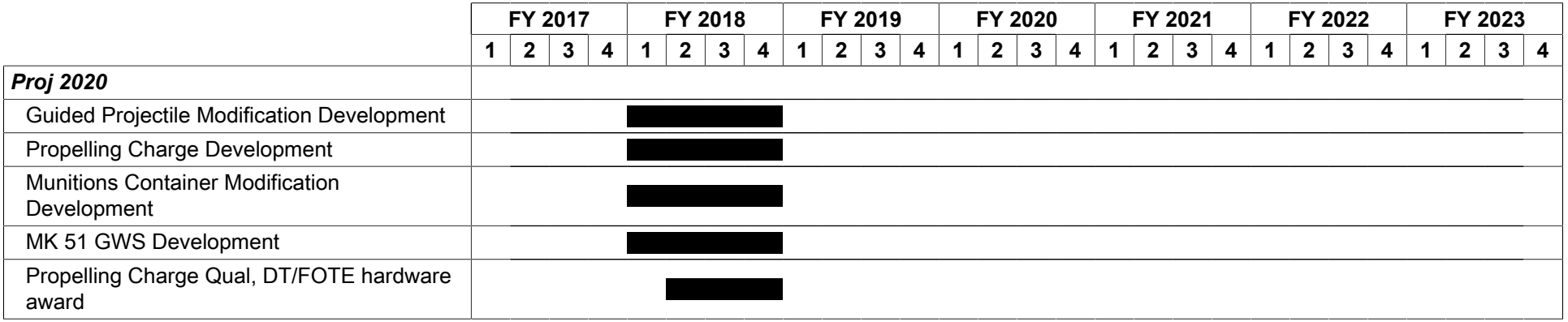
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Contract Support Services | C/CPFF | CACI : Arlington, VA | 0.000 | 0.000 | | 0.300 | Oct 2017 | 0.000 | | - | | 0.000 | 0.900 | 1.200 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.300 | | 0.000 | | - | | 0.000 | 0.900 | 1.200 | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 18.000 | | 0.000 | | - | | 0.000 | 101.000 | 119.000 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603795N / *Land Attack Tech* | **Project (Number/Name)**<br>2020 / *Advanced Gun System Projectile* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603795N / *Land Attack Tech* | **Project (Number/Name)**<br>2020 / *Advanced Gun System Projectile* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 2020*** | | | | |
| Guided Projectile Modification Development | 1 | 2018 | 4 | 2018 |
| Propelling Charge Development | 1 | 2018 | 4 | 2018 |
| Munitions Container Modification Development | 1 | 2018 | 4 | 2018 |
| MK 51 GWS Development | 1 | 2018 | 4 | 2018 |
| Propelling Charge Qual, DT/FOTE hardware award | 2 | 2018 | 4 | 2018 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603795N / *Land Attack Tech* | Project (Number/Name)<br>2038 / *ADVANCED MINOR CALIBER GUN* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2038: *ADVANCED MINOR CALIBER GUN* | 15.471 | 1.073 | 2.100 | 0.000 | 1.400 | 1.400 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 20.044 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The Advanced Minor Caliber Gun project supported non-recurring engineering, component integration, testing and qualification efforts required for the capability upgrades to the MK 38 MOD 2, a minor caliber gun weapon system. The new configuration (MOD 3) creates a near term improvement to address ship based, close range solutions to defeat the Fast Attack Craft (FAC)/Fast In-Shore Attack Craft (FIAC) threat. The MK 38 MOD 2 was developed in FY 2004 to outfit near term deployers to counter small boat threats.

OCO: In order to respond to the Joint Urgent Operational Need (CC-0558) for Counter Unmanned Aerial Systems (CUAS), the MK 38 MOD 2 Machine Gun System will be upgraded to counter these threats. Both FY2018 and FY2019 funding in OCO supports the modifications for this requirement. Fielding is expected to start 1st quarter FY20.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Systems Engineering and Testing | 1.073 | 2.100 | 0.000 | 1.400 | 1.400 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Begin development of system requirements and specifications.<br>Begin development and incremental testing of Counter-Unmanned Aerial System (C-UAS) software upgrade.<br>Procure Engineering Prototype Hardware<br>Develop Introductory Safety Review Board package for Weapon System Explosives Safety Review Board Concurrence. | | | | | |
| ***FY 2019 Base Plans:***<br>N/A | | | | | |
| ***FY 2019 OCO Plans:***<br>- Delivery of final Counter-UAS capability software release<br>- Complete land-based and at-sea qualification testing<br>- Obtain WSESRB concurrence for deployment<br>- Obtain element certification of new MK 38 HW/W baseline | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603795N / *Land Attack Tech* | **Project (Number/Name)**<br>2038 / *ADVANCED MINOR CALIBER GUN* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Field engineering design model for Initial Operational Capability<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Decrease from FY 2018 to FY2019 due to nearing completion of efforts supporting Joint Urgent Operational Need (CC-0558) for Counter Unmanned Aerial Systems (CUAS). | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 1.073 | 2.100 | 0.000 | 1.400 | 1.400 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Hardware improvement based on engineering changes was integrated into FY 2017 and follow-on production orders.

**E. Performance Metrics**

Quarterly program reviews and semi-annual product certification panel reviews.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603795N / *Land Attack Tech* | Project (Number/Name)<br>2038 / *ADVANCED MINOR CALIBER GUN* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Primary Product Integration | SS/BOA | BAE Systems : Minneapolis MN | 12.062 | 0.663 | Apr 2017 | 1.500 | Mar 2018 | 0.000 | | 0.500 | Nov 2018 | 0.500 | 0.000 | 14.725 | - |
| | | **Subtotal** | 12.062 | 0.663 | | 1.500 | | 0.000 | | 0.500 | | 0.500 | 0.000 | 14.725 | N/A |

**Remarks**

ECPs spiral development - Electro Optical Site (EOS) capabilities

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Government Engineering Services | WR | NSWC, DD : Dahlgren, VA | 2.406 | 0.343 | Jan 2017 | 0.200 | Mar 2018 | 0.000 | | 0.500 | Nov 2018 | 0.500 | 0.000 | 3.449 | - |
| Government Engineering Services | WR | NSWC, IHD : Picatinny, NJ | 0.638 | 0.002 | Oct 2017 | 0.200 | Mar 2018 | 0.000 | | 0.200 | Nov 2018 | 0.200 | 0.000 | 1.040 | - |
| Government Engineering Seervices | WR | NSWC, CR : Crane, IN | 0.000 | 0.065 | Oct 2017 | 0.200 | Mar 2018 | 0.000 | | 0.200 | Nov 2018 | 0.200 | 0.000 | 0.465 | - |
| | | **Subtotal** | 3.044 | 0.410 | | 0.600 | | 0.000 | | 0.900 | | 0.900 | 0.000 | 4.954 | N/A |

**Remarks**

Configuration Management (CM) work engineering tech manuals updates.

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Support Services | C/CPFF | ALION : Washington, DC | 0.365 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.365 | - |
| | | **Subtotal** | 0.365 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.365 | N/A |

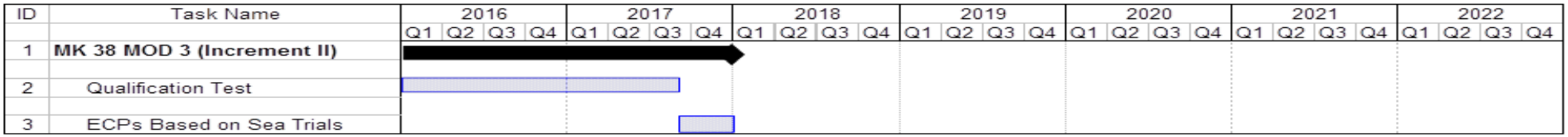
| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603795N / *Land Attack Tech* | Project (Number/Name)<br>2038 / *ADVANCED MINOR CALIBER GUN* | |

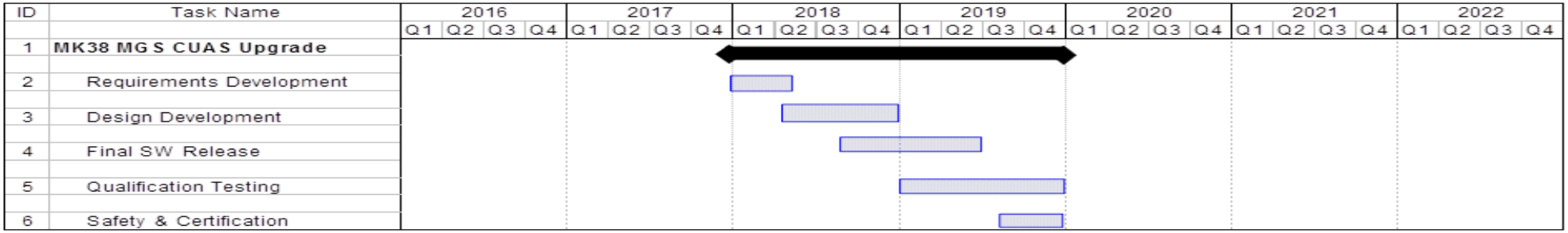
| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 15.471 | 1.073 | | 2.100 | | 0.000 | | 1.400 | | 1.400 | 0.000 | 20.044 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603795N / *Land Attack Tech* | **Project (Number/Name)**<br>2038 / *ADVANCED MINOR CALIBER GUN* |

# 2038 / Advance Minor Caliber Gun Program Schedule

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| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603795N / *Land Attack Tech* | **Project (Number/Name)**<br>2038 / *ADVANCED MINOR CALIBER GUN* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 2038*** | | | | |
| Increment II Qualification Test | 1 | 2017 | 3 | 2017 |
| Engineering Changes based on Sea Trials | 3 | 2017 | 4 | 2017 |
| Requirements and Design Development | 1 | 2018 | 4 | 2018 |
| Final SW Release Counter (UAS) | 3 | 2018 | 2 | 2019 |
| Qualification Testing | 1 | 2019 | 4 | 2019 |
| Safety and Element Certification | 3 | 2019 | 3 | 2019 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603795N / *Land Attack Tech* | Project (Number/Name)<br>3370 / *Railgun* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3370: *Railgun* | 0.000 | 4.581 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 4.581 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The Hyper Velocity Projectile Block (BLK) 0 will double the range of the current 5-inch conventional ammunition to support multi-mission operational requirements for Anti-Surface Warfare (ASuW), Anti-Air Warfare (AAW), and Naval Surface Fire Support (NSFS) missions. This project executes pre Milestone B (MS B) activities and begins preparations for the Engineering, Manufacturing, and Development Phase planned for FY 2019. This includes development of the system specification and interfaces, and support Hyper Velocity Projectile risk reduction efforts required to transition to Milestone B (MS B). The Hyper Velocity Projectile project was previously funded under the PE 0603925N / Directed Energy and Electronic Weapon Systems.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Systems Engineering and Testing | 4.581 | 0.000 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY 2018 plans is funded under project 3401: Guided Projectile. | | | | | |
| ***FY 2019 Base Plans:***<br>N/A | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No change from FY 2018 to FY 2019. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 4.581 | 0.000 | 0.000 | 0.000 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Leveraging the ONR sponsored Future Naval Capabilities project, SCO activities, and Gov't developed Interface Control Drawings and specifications to establish a competitive solicitation for E&MD Phase in FY 2020.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603795N / *Land Attack Tech* | **Project (Number/Name)**<br>3370 / *Railgun* |

**E. Performance Metrics**

Quarterly Program Reviews, Monthly Reports, and Periodic Design Reviews.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603795N / *Land Attack Tech* | Project (Number/Name)<br>3370 / *Railgun* | |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Government Enginerring Services | WR | NSWC, DD : Dahlgren, VA | 0.000 | 3.671 | Jan 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.671 | - |
| Government Enginerring Services | WR | NSWC, Indian Head : Indian Head, MD | 0.000 | 0.250 | Oct 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.250 | - |
| Government Engineering Services | WR | NSWC IHD Picatinny Detachment : Picatinny Arsenal, NJ | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | - |
| Government Engineering Services | MIPR | COTF/MCOTEA : Norfolk, VA | 0.000 | 0.039 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.039 | - |
| HVP Tactical Development Risk Reduction Studies/ Analysis | C/CPFF | DOTC Competively Selected Vendor: TBD : L3 | 0.000 | 0.116 | Jan 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.116 | - |
| Program Support Services | C/CPFF | MITRE : McLean, VA | 0.000 | 0.350 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.350 | - |
| | | **Subtotal** | 0.000 | 4.426 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 4.426 | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hypervelocity Projectile | WR | NSWC PHD : Pt. Hueneme, CA | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | N/A |

**Management Services ($ in Millions)**

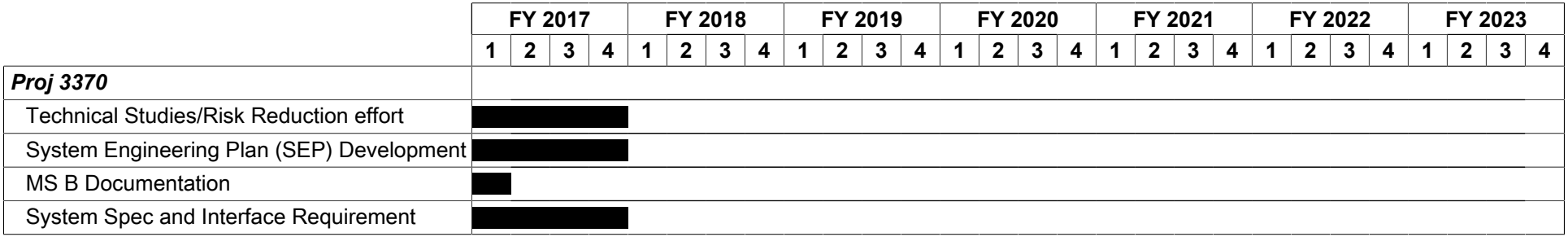
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WNY Front Office Corp Ops | C/CPFF | NAVSEA : WNY | 0.000 | 0.141 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.141 | - |
| Cancelled Accounts | C/CPFF | NAVSEA : WNY | 0.000 | 0.014 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.014 | - |
| | | **Subtotal** | 0.000 | 0.155 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.155 | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603795N / *Land Attack Tech* | Project (Number/Name)<br>3370 / *Railgun* | |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 4.581 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 4.581 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603795N / *Land Attack Tech* | **Project (Number/Name)**<br>3370 / *Railgun* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603795N / *Land Attack Tech* | **Project (Number/Name)**<br>3370 / *Railgun* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3370*** | | | | |
| Technical Studies/Risk Reduction effort | 1 | 2017 | 4 | 2017 |
| System Engineering Plan (SEP) Development | 1 | 2017 | 4 | 2017 |
| MS B Documentation | 1 | 2017 | 1 | 2017 |
| System Spec and Interface Requirement | 1 | 2017 | 4 | 2017 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | | | | | R-1 Program Element (Number/Name)<br>PE 0603795N / *Land Attack Tech* | | | | Project (Number/Name)<br>3401 / *Guided Projectile* | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| 3401: *Guided Projectile* | 0.000 | 0.000 | 15.568 | 15.529 | - | 15.529 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 31.097 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

Decrease of $263K a result of OSD Budgetary PBD/RMD Adjustments and DON Leadership Decisions results in decrease in DOTC funded amount.

**A. Mission Description and Budget Item Justification**

The Gun Launched Guided Projectile effort will double the range of the current 5-inch conventional ammunition while meeting multi-mission operational requirements for Anti-Surface Warfare (ASuW), Anti-Air Warfare (AAW), and Naval Surface Fire Support (NSFS) missions. This project executes pre milestone (MS) B activities and begins preparations for the Engineering, Manufacturing, and Development Phase planned for FY 2020. This includes development of system specifications and interface control documents to support MS B. Maturation of subcomponents and integration risk reduction efforts will be initiated to support MS B Acquisition Milestone and Competitive E&MD Award. The Gun Launched Guided Projectile project was previously funded under the PE 0603925N / Directed Energy and Electronic Weapon Systems (Proj: 3370 Railgun) and 0603795N / Land Attack Tech (Proj: 3370 Railgun). This is not a new start.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Systems Engineering and Testing | 0.000 | 15.568 | 15.529 | 0.000 | 15.529 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Continue development of Mechanical and Electrical Interface Control Documentation (ICDs).<br>Continue Tactical Subcomponent Risk Reduction Development Efforts.<br>Test MK 45 Mod 4 Initialization and Gun Mount Prototypes verifying interfaces and specifications.<br>Develop documentation required for MS B Entrance Criteria.<br>Continue Risk Reduction Studies.<br>Develop System Architecture for Combat System Integration. | | | | | |
| ***FY 2019 Base Plans:***<br>Finalize and publish Request for Proposals for Engineering, Manufacturing, and Development award.<br>Evaluate technical and cost proposals.<br>Complete development of Mechanical and Electrical Interface Control Documentation (ICDs)<br>Complete documentation required for MS B Entrance Criteria.<br>Continue Tactical Subcomponent Risk Reduction Development Efforts.<br>Continue to develop System Architecture for Combat System Integration. | | | | | |
| ***FY 2019 OCO Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603795N / *Land Attack Tech* | **Project (Number/Name)**<br>3401 / *Guided Projectile* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No significant change from FY 2018 to FY 2019. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 15.568 | 15.529 | 0.000 | 15.529 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Leveraging the ONR sponsored Future Naval Capabilities project, SCO activities, and Gov't developed Interface Control Drawings and specification to establish a competitive solicitation for Engineering & Manufacturing Development (E&MD) Phase.

**E. Performance Metrics**

Quarterly Program Reviews, Monthly Reports, and Periodic Design Reviews.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603795N / *Land Attack Tech* | Project (Number/Name)<br>3401 / *Guided Projectile* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Government Engineering Services | WR | NSWC Indian Head : Indian Head, MD | 0.000 | 0.000 | | 0.308 | Nov 2017 | 0.455 | Oct 2018 | - | | 0.455 | 0.000 | 0.763 | - |
| Projectile Tactical Development | WR | DOTC Competitively Selected Commercial Vendor : Picatinny, NJ | 0.000 | 0.000 | | 5.375 | Dec 2017 | 6.581 | Oct 2018 | - | | 6.581 | 0.000 | 11.956 | - |
| CSEA Integration | C/CPFF | Lockheed Martin : Minneapolis, MN | 0.000 | 0.000 | | 1.000 | Nov 2017 | 1.068 | Oct 2018 | - | | 1.068 | 0.000 | 2.068 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 6.683 | | 8.104 | | - | | 8.104 | 0.000 | 14.787 | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Government Engineering Services | WR | NSWC DD : Dahlgren, VA | 0.000 | 0.000 | | 4.825 | Oct 2017 | 5.150 | Oct 2018 | - | | 5.150 | 0.000 | 9.975 | - |
| Analysis of Alternatives | C/CPFF | CACI : Arlington, VA | 0.000 | 0.000 | | 2.000 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 2.000 | - |
| Government Engineering Services | WR | COTF/MCOTEA : Norfolk, VA | 0.000 | 0.000 | | 0.290 | Nov 2017 | 0.290 | Oct 2018 | - | | 0.290 | 0.000 | 0.580 | - |
| Program Support Services | C/CPFF | MITRE : McLean, VA | 0.000 | 0.000 | | 0.350 | Nov 2017 | 0.450 | Oct 2018 | - | | 0.450 | 0.000 | 0.800 | - |
| Program Support Services | C/CPFF | JHU/APL : Baltimore, MD | 0.000 | 0.000 | | 0.300 | Oct 2017 | 0.300 | Oct 2018 | - | | 0.300 | 0.000 | 0.600 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 7.765 | | 6.190 | | - | | 6.190 | 0.000 | 13.955 | N/A |

**Management Services ($ in Millions)**

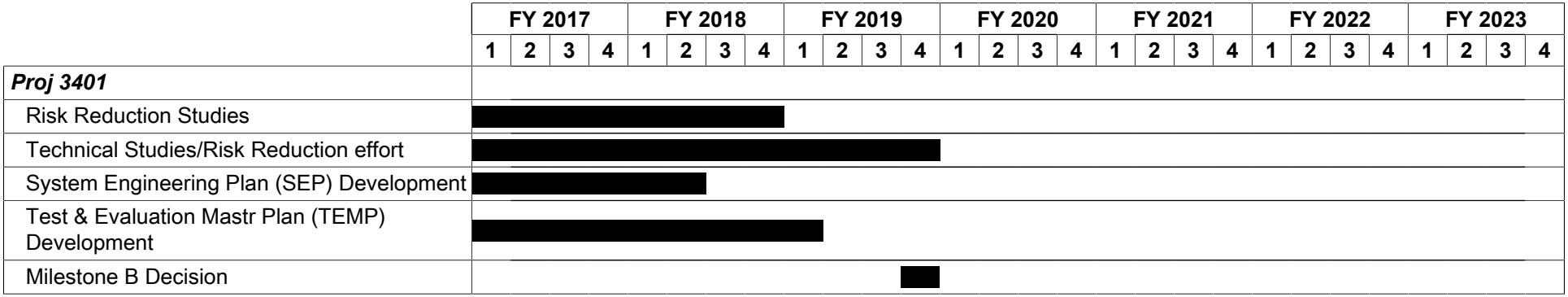
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IWS 3.0 Support | C/CPFF | TMB, CACI, Alion : Arlington, VA | 0.000 | 0.000 | | 1.120 | Oct 2017 | 1.235 | Oct 2018 | - | | 1.235 | 0.000 | 2.355 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 1.120 | | 1.235 | | - | | 1.235 | 0.000 | 2.355 | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603795N / *Land Attack Tech* | Project (Number/Name)<br>3401 / *Guided Projectile* | |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 15.568 | | 15.529 | | - | | 15.529 | 0.000 | 31.097 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603795N / *Land Attack Tech* | **Project (Number/Name)**<br>3401 / *Guided Projectile* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603795N / *Land Attack Tech* | **Project (Number/Name)**<br>3401 / *Guided Projectile* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3401*** | | | | |
| Risk Reduction Studies | 1 | 2017 | 4 | 2018 |
| Technical Studies/Risk Reduction effort | 1 | 2017 | 4 | 2019 |
| System Engineering Plan (SEP) Development | 1 | 2017 | 2 | 2018 |
| Test & Evaluation Mastr Plan (TEMP) Development | 1 | 2017 | 1 | 2019 |
| Milestone B Decision | 4 | 2019 | 4 | 2019 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603795N / *Land Attack Tech* | Project (Number/Name)<br>9999 / *Congressional Adds* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9999: *Congressional Adds* | 0.000 | 11.606 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 11.606 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The objective is to demonstrate a 5-inch guided projectile capable of conducting Naval Surface Fire Support missions to a range of not less than 26 nautical miles (nmi). Priority consideration will be given to mature designs capable of achieving qualification for fleet introduction in the near term.

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2017 | FY 2018 |
|---|---|---|
| ***Congressional Add:*** Fly Off Competition | 11.606 | 0.000 |
| ***FY 2017 Accomplishments:*** -Select qualified vendors via a Broad Agency Announcement.<br>-Award multiple contracts.<br>-Obtain prototype projectiles.<br>-Conduct land-based demonstration testing of guided munitions.<br>-Review data and document results. | | |
| ***FY 2018 Plans:*** N/A | | |
| **Congressional Adds Subtotals** | 11.606 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Competitively select qualified vendors to conduct demonstrations.

**E. Performance Metrics**

Flight Test Readiness Reviews & Test Reports.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603795N / *Land Attack Tech* | Project (Number/Name)<br>9999 / *Congressional Adds* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Production of test flight hardware | C/FFP | TBD : TBD | 0.000 | 8.090 | Feb 2018 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 8.090 | - |
| | | **Subtotal** | 0.000 | 8.090 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 8.090 | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Navy Tech Team | WR | NSWC, IH : Picatinny Arsenal, NJ | 0.000 | 0.669 | Dec 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.669 | - |
| | | **Subtotal** | 0.000 | 0.669 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.669 | N/A |

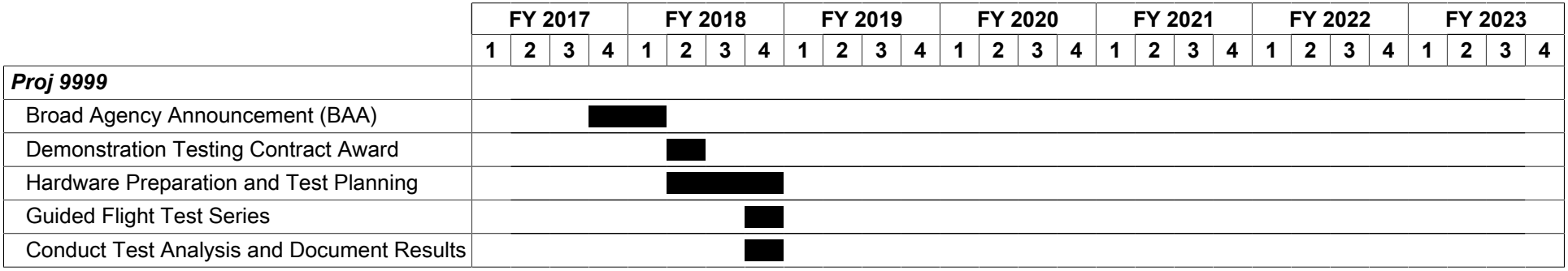
**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Range Test Support | WR | NSWC DD : Dahlgren, VA | 0.000 | 0.206 | Jan 2018 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.206 | - |
| Test Range | WR | White Sands Missle Range : WhiteSands, NM | 0.000 | 2.641 | Jan 2018 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.641 | - |
| | | **Subtotal** | 0.000 | 2.847 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.847 | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 11.606 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 11.606 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603795N / *Land Attack Tech* | **Project (Number/Name)**<br>9999 / *Congressional Adds* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603795N / *Land Attack Tech* | **Project (Number/Name)**<br>9999 / *Congressional Adds* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 9999*** | | | | |
| Broad Agency Announcement (BAA) | 4 | 2017 | 1 | 2018 |
| Demonstration Testing Contract Award | 2 | 2018 | 2 | 2018 |
| Hardware Preparation and Test Planning | 2 | 2018 | 4 | 2018 |
| Guided Flight Test Series | 4 | 2018 | 4 | 2018 |
| Conduct Test Analysis and Document Results | 4 | 2018 | 4 | 2018 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603851M *I Joint Non-Lethal Weapons Testing* |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Program Element | 521.096 | 26.760 | 29.873 | 27.581 | - | 27.581 | 28.611 | 28.234 | 29.850 | 30.453 | Continuing | Continuing |
| 2319: *Non-Lethal Weapons* | 521.096 | 26.760 | 29.873 | 27.581 | - | 27.581 | 28.611 | 28.234 | 29.850 | 30.453 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

The DoD Non-Lethal Weapons Program was established by the FY96 National Defense Authorization Act. The Office of the Secretary of Defense designated the Commandant of the Marine Corps (CMC) as the DoD NLW Executive Agent (EA). The EA exercises centralized responsibility for joint research and development of non-lethal weapons and technology through the Joint Non-Lethal Weapons Program (JNLWP). The Office of the Under Secretary of Defense for Acquisition, Technology and Logistics serves as the OSD Principal Staff Assistant and oversees, in consultation with the Under Secretary of Defense for Policy, the DoD NLW Executive Agent.

The efforts described in this Program Element (PE) reflect Joint Service research and development (R&D) investment decisions provided by the Joint Non-Lethal Weapons Integrated Product Team, a multi-service flag level corporate board that provides executive oversight and management of the JNLWP for the EA. Research conducted is based on the needs and capabilities of the Services, the Special Operations Command and the Coast Guard, as identified in JROC-approved Joint Non-Lethal Effects Initial Capabilities Documents. This coordinated joint R&D development approach addresses mutual capability gaps and assures the best non-lethal technologies, capabilities and equipment are provided to the operating forces while eliminating duplicative Service investment. Advanced Component Development and Prototypes initiatives provide non-lethal capabilities which directly support the three pillars of the current Quadrennial Defense Review and comprise a fundamental part of DoD's security cooperation efforts to build partner capacity. The resulting capabilities will facilitate a fully integrated non-lethal competency as a complement to lethal firepower, providing force application options for short-of-lethal scenarios.

This PE funds Joint Service research, development, test, and evaluation of non-lethal weapons, devices, munitions and technologies which provide a non-lethal capability to minimize significant injuries as well as undesired damage to property and the environment. Counter-personnel and counter-materiel capability investment areas include directed energy (lasers, millimeter wave and high power microwave), multi-sensory suppression/incapacitation initiatives (acoustics, optical, electro-muscular incapacitation), and other emergent technologies transitioning from coordinated JNLWP Science and Technology PE initiatives. Investments also focus on Joint and allied experimentation, exercise, demonstration and assessment of advanced component and prototype initiatives in order to assist transition of suitable and effective capabilities to both joint and allied operational applications.

The Joint Non-Lethal Weapons Directorate is designated as a R&D organization and was established by the EA to manage the day to day research and development activities of the DoD's JNLWP. Each Service is responsible for their procurement and operating support costs.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | Date: February 2018 |
|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | R-1 Program Element (Number/Name)<br>PE 0603851M *I Joint Non-Lethal Weapons Testing* | | | |
| **B. Program Change Summary ($ in Millions)** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** |
| Previous President's Budget | 27.904 | 29.873 | 28.305 | - | 28.305 |
| Current President's Budget | 26.760 | 29.873 | 27.581 | - | 27.581 |
| Total Adjustments | -1.144 | 0.000 | -0.724 | - | -0.724 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | -0.726 | 0.000 | | | |
| • SBIR/STTR Transfer | -0.407 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | -0.337 | - | -0.337 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -0.387 | - | -0.387 |
| • Congressional General Reductions Adjustments | -0.011 | - | - | - | - |

**Change Summary Explanation**

The FY 2019 funding request was reduced by ($.337) million to reflect the Department of Navy's effort to support the Office of Management and Budget directed reforms for Efficiency and Effectiveness that include a lean, accountable, more efficient government.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603851M / *Joint Non-Lethal Weapons Testing* | Project (Number/Name)<br>2319 / *Non-Lethal Weapons* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2319: *Non-Lethal Weapons* | 521.096 | 26.760 | 29.873 | 27.581 | - | 27.581 | 28.611 | 28.234 | 29.850 | 30.453 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

This project develops non-lethal weapon (NLW) capabilities that minimize fatal or permanent injuries and undesired damage to property and the environment. These capabilities are designed to stun, incapacitate, or hinder movement of individuals, crowds or equipment. The availability of NLW allows commanders less than lethal options, particularly in urban warfare and military operations other than war, i.e. peacekeeping, humanitarian assistance and disaster relief, as well as special operations. The increase of $1.969M is to support new initiatives in Counter-Materiel Advanced Component Development and Prototypes and Joint and Allied Exercise, Experimentation, Demonstration and Assessment.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Counter-Personnel Advanced Component Development and Prototypes | 13.504 | 12.033 | 11.324 | 0.000 | 11.324 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>- Continued coordination and requirements development for Service counter-personnel (CP) prototyping initiatives within the JNLWP. This includes SOCOM and USCG.<br>- Continued development and assessment of Service-led CP NL prototype initiatives.<br>- Continued maturation of CP directed energy technologies to increase system efficiencies and reduce system size, weight and cost in preparation for transition to joint acquisition programs of record.<br>- Continued the advanced development of CP emerging technologies to support Service capability gaps and priorities as they support the Combatant Commanders.<br>- Continued technology maturation and risk reduction of competing approaches to inform decisions for Service capability development.<br>- Continued prototype development and assessment of advanced payloads for technological capabilities relevant to emerging counter-personnel capability gaps.<br>- Continued prototype development and demonstration for the most promising technologies employing multisensory stimuli.<br>- Continued program management support for CP efforts.<br>- Continued munitions testing and acquisition documentation of NL capability to deny, move and suppress individuals at long ranges from currently fielded weapons systems. | | | | | |
| ***FY 2019 Base Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603851M / *Joint Non-Lethal Weapons Testing* | **Project (Number/Name)**<br>2319 / *Non-Lethal Weapons* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Continue all efforts from FY 2018 except those noted as completed.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No significant change from FY 2018 to FY 2019. | | | | | |
| ***Title:*** Counter-Materiel Advanced Component Development and Prototypes | 9.362 | 11.336 | 10.574 | 0.000 | 10.574 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>- Continued coordination and requirements development for Service counter-material (CM) prototyping initiatives within the JNLWP. This includes SOCOM and USCG.<br>- Continued development and assessment of Service-led CM NL prototype initiatives.<br>- Continued maturation of CM directed energy technologies to increase system efficiencies and reduce system size, weight and cost in preparation for transition to joint acquisition programs of record.<br>- Continued the advanced development of Counter-Materiel emerging technologies to support Service capability gaps and priorities as they support the Combatant Commanders.<br>- Continued technology maturation and risk reduction of competing approaches to inform decisions for Service capability development.<br>- Continued prototype development and assessment of advanced payloads for technological capabilities relevant to emerging counter-materiel capability gaps.<br>- Continued program management support for CM efforts.<br>- Continued development of the conceptual design of non-lethal Directed Energy (DE) vessel-stopping capability, including electro-magnetic and engagement modeling, platform feasibility and integration studies, and target characterization and validation.<br>- Initiated production qualification testing of a Service-endorsed pre-emplaced, counter-materiel, counter vehicle stopping capability.<br>- Initiated Critical Design Review for counter material: Radio Frequency vehicle stopper prototype capability<br>***FY 2019 Base Plans:***<br>- Continue all efforts from FY 2018 except those noted as completed. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603851M / *Joint Non-Lethal Weapons Testing* | **Project (Number/Name)**<br>2319 / *Non-Lethal Weapons* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Initiate advanced component development and prototyping support to the U.S. Navy's candidate Maritime Vessel Stopping capability.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No significant change from FY 2018 to FY 2019. | | | | | |
| ***Title:*** Joint and Allied Exercise, Experimentation, Demonstration and Assessment | 3.894 | 6.504 | 5.683 | 0.000 | 5.683 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>- Continued modeling and simulation (M&S) of NLWs in warfighter training/gaming models and performance effects data collection/population to demonstrate/analyze NL effects and support optimization of training.<br>- Continued evaluation of NLWs by Service warfighting laboratories and Joint Staff, J7, Joint and Coalition Warfighting for direct user feedback of various non-lethal (NL) technologies and munitions to include policy and strategy and strategic communication.<br>- Continued engagement with NATO on cooperative security efforts, to include providing input for Systems Analysis and Studies (SAS) Panels and NATO assessment of NLW in appropriate allied scenarios and exercises. Specifically, completed the 2017 NATO Non-Lethal Technology Concept Development Game and Tabletop Exercise - Counter Unmanned Aerial Systems (NNTEX-17C).<br>- Continued interaction with Combatant Commander staffs to evaluate emerging NLW capabilities and their utility in theater operations and Defense of the Homeland missions.<br>- Continued effort to assess the utility, effect, and effectiveness of technologies for incapacitating personnel, clearing facilities, stopping vehicles and vessels, and denying enemy access to protected areas. Specifically, completed support to the JIDO Elephant Foot Concept Demonstration by providing prototype vehicle stopping capabilities for integration into this C-VBIED system of systems concept demonstration.<br>- Continued to identify, test, and evaluate newly developed commercial products that may meet Joint service requirements for specific non-lethal capability set common items.<br>- Continued program management support for Joint and Allied Exercise, Experimentation, Demonstration and Assessment efforts.<br>- Continued support of Combatant Commanders (CCMD) by demonstrating and assessing NLW capabilities for multiple priority mission areas, such as port opening operations; Humanitarian Assistance and Disaster Relief | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603851M / *Joint Non-Lethal Weapons Testing* | **Project (Number/Name)**<br>2319 / *Non-Lethal Weapons* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| (HA/DR) and Counter-Transnational Organized Crime (CTOC) operations; and harbor and in-transit security operations.<br>- Continued support of two CCMDs by demonstrating and assessing NLW capabilities for vessel interdiction and counter-migration exercises. Specifically, completed support to USAFRICOM in exercise African Lion 2017 and to USEUCOM/USAFRICOM in exercise Phoenix Express 2017.<br>- Initiated leadership of the NATO Special Area Study 133 (SAS-133) panel addressing challenges in fielding NL capabilities.<br>***FY 2019 Base Plans:***<br>- Continue all efforts from FY 2018 except those noted as completed.<br>- Complete the 2018 NATO Non-Lethal Technology Exercise - CUAS (NNTEX-18C)<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No significant change from FY 2018 to FY 2019. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 26.760 | 29.873 | 27.581 | 0.000 | 27.581 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • PE 0602651M: *Joint Non-Lethal Weapons Applied Research* | 6.146 | 6.425 | 6.349 | - | 6.349 | 6.346 | 6.343 | 6.468 | 6.600 | Continuing | Continuing |
| • PE 0603651M: *Joint Non-Lethal Weapons Advanced Technology Development* | 12.790 | 13.448 | 13.313 | - | 13.313 | 13.307 | 13.301 | 13.564 | 13.840 | Continuing | Continuing |

**Remarks**

**D. Acquisition Strategy**

The JNLW Program strategy is to continue to pursue the fielding of NLW systems through modifying Commercial-Off-The-Shelf (COTS) products for near term capabilities and the development of new technology NLW systems in various stages of acquisition. These are balanced with efforts in state-of-the-art technology investment, experimentation, and modeling and simulation. The acquisition strategy for each weapon system is largely Lead Service dependent. The JNLWP provides

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603851M / *Joint Non-Lethal Weapons Testing* | **Project (Number/Name)**<br>2319 / *Non-Lethal Weapons* |

RDT&E funding while the Services are responsible for procurement and operations and maintenance funding. For complex development programs, such as directed energy research, JNLWP RDT&E funds will support each Service's RDT&E joint application efforts.

**E. Performance Metrics**

N/A

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603851M / *Joint Non-Lethal Weapons Testing* | **Project (Number/Name)**<br>2319 / *Non-Lethal Weapons* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NLW Product Development | MIPR | ARDEC : Picatinny, NJ | 54.732 | 1.010 | Oct 2016 | 1.129 | Oct 2017 | 3.192 | Oct 2018 | - | | 3.192 | Continuing | Continuing | Continuing |
| NLW Product Development | MIPR | SOCOM : McDill AFB, FL | 26.065 | 0.275 | Oct 2016 | 0.283 | Oct 2017 | 0.289 | Oct 2018 | - | | 0.289 | Continuing | Continuing | Continuing |
| NLW Product Development | Various | NSWC : Various | 42.264 | 4.688 | Oct 2016 | 4.829 | Oct 2017 | 6.175 | Oct 2018 | - | | 6.175 | Continuing | Continuing | Continuing |
| NLW Product Development | MIPR | USAF : Ft. Sam Houston AFB, TX | 58.216 | 0.670 | Oct 2016 | 0.690 | Oct 2017 | 0.525 | Oct 2018 | - | | 0.525 | Continuing | Continuing | Continuing |
| NLW Product Development | Various | MCSC : Quantico, VA | 32.287 | 1.432 | Oct 2016 | 1.475 | Oct 2017 | 0.475 | Oct 2018 | - | | 0.475 | Continuing | Continuing | Continuing |
| NLW Product Development | Various | Uniformed Services : Various | 167.642 | 9.774 | Oct 2016 | 12.442 | Oct 2017 | 7.718 | Oct 2018 | - | | 7.718 | Continuing | Continuing | Continuing |
| Prior Year NLW Product Development | Various | Various : Various | 65.401 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 65.401 | - |
| | | **Subtotal** | 446.607 | 17.849 | | 20.848 | | 18.374 | | - | | 18.374 | Continuing | Continuing | N/A |

**Remarks**

Joint Program funds are distributed amongst the USA, USAF, USN, USMC, SOCOM, and USCG in support of NLW research and development efforts. Each Cost Category Item does not correlate to an individual project/effort. They fund multiple non-lethal projects/efforts that are incrementally funded throughout the fiscal year as each service identifies the project/effort requiring funding. October award dates reflect the start of incremental funding and does not indicate that the full amount will be awarded in October.

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NLW Support Cost | WR | NSWC : Dahlgren, VA | 16.774 | 0.600 | Oct 2016 | 0.618 | Oct 2017 | 0.632 | Oct 2018 | - | | 0.632 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 16.774 | 0.600 | | 0.618 | | 0.632 | | - | | 0.632 | Continuing | Continuing | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603851M / *Joint Non-Lethal Weapons Testing* | **Project (Number/Name)**<br>2319 / *Non-Lethal Weapons* |

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| JNLW Management Support | Various | MCSC : Quantico, VA | 16.994 | 8.311 | Oct 2016 | 8.407 | Oct 2017 | 8.575 | Oct 2018 | - | | 8.575 | Continuing | Continuing | Continuing |
| Prior Year Management Services | Various | Various : Various | 40.721 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 40.721 | - |
| | | **Subtotal** | 57.715 | 8.311 | | 8.407 | | 8.575 | | - | | 8.575 | Continuing | Continuing | N/A |

**Remarks**

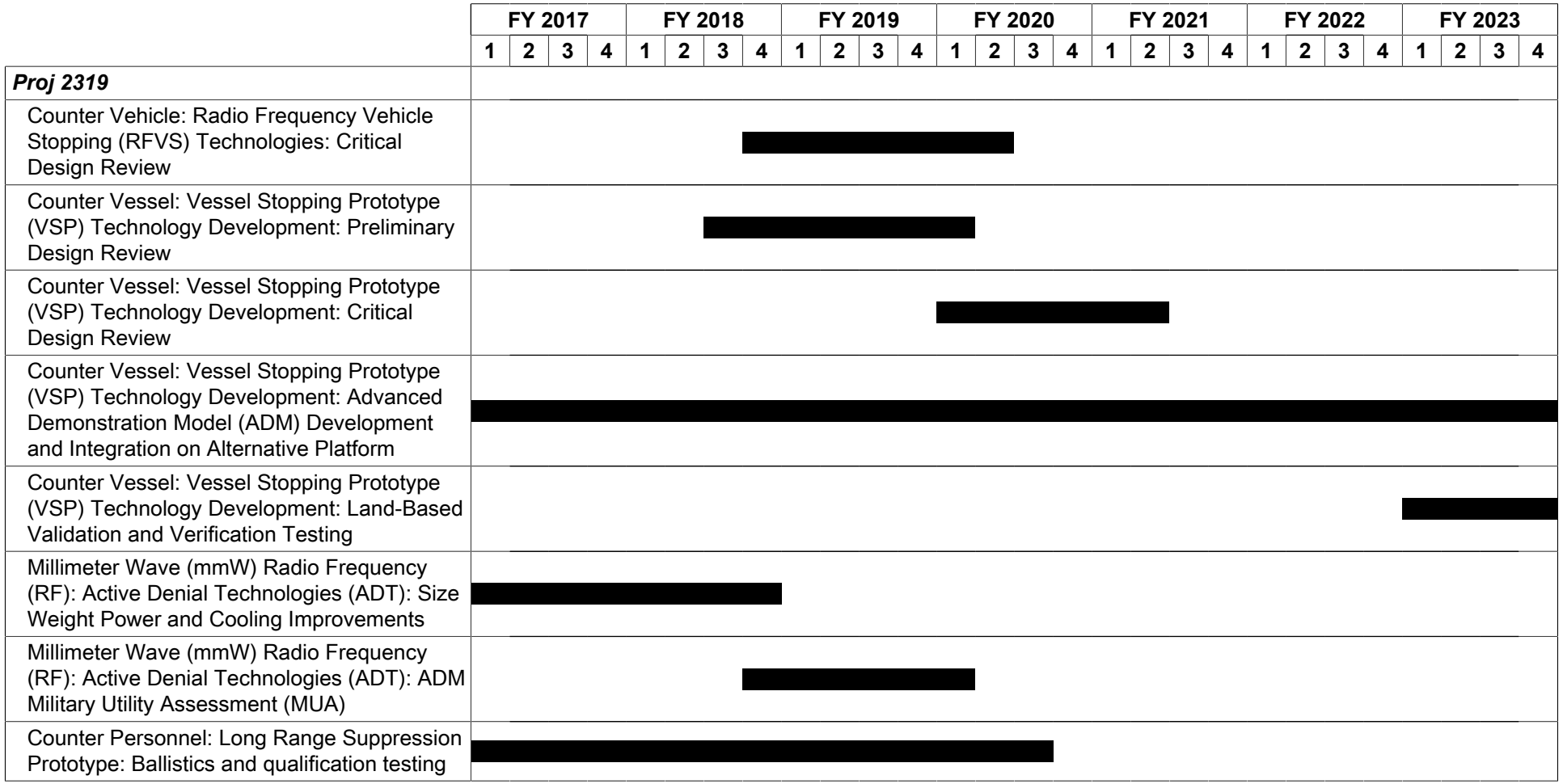
The JNLW Management Support was previously incorporated into the various cost categories instead of being displayed in the corresponding section of the R-3. The Management Services section of the R-3 now reflects the amounts for civilian salaries and contractor program management. The funding fluctuates across the R-2A categories based on the demand signals of the Services, USSOCOM, and the USCG.

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 521.096 | 26.760 | | 29.873 | | 27.581 | | - | | 27.581 | Continuing | Continuing | N/A |

**Remarks**

Joint Program funds are distributed amongst the USA, USAF, USN, USMC, SOCOM, and USCG in support of NLW research and development efforts. Each Cost Category Item does not correlate to an individual project/effort. They fund multiple non-lethal projects/efforts that are incrementally funded throughout the fiscal year as each service identifies the project/effort requiring funding. October award dates reflect the start of incremental funding and does not indicate that the full amount will be awarded in October.

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603851M / *Joint Non-Lethal Weapons Testing* | **Project (Number/Name)**<br>2319 / *Non-Lethal Weapons* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603851M / *Joint Non-Lethal Weapons Testing* | **Project (Number/Name)**<br>2319 / *Non-Lethal Weapons* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 2319*** | | | | |
| Counter Vehicle: Radio Frequency Vehicle Stopping (RFVS) Technologies: Critical Design Review | 4 | 2018 | 2 | 2020 |
| Counter Vessel: Vessel Stopping Prototype (VSP) Technology Development: Preliminary Design Review | 3 | 2018 | 1 | 2020 |
| Counter Vessel: Vessel Stopping Prototype (VSP) Technology Development: Critical Design Review | 1 | 2020 | 2 | 2021 |
| Counter Vessel: Vessel Stopping Prototype (VSP) Technology Development: Advanced Demonstration Model (ADM) Development and Integration on Alternative Platform | 1 | 2017 | 4 | 2023 |
| Counter Vessel: Vessel Stopping Prototype (VSP) Technology Development: Land-Based Validation and Verification Testing | 1 | 2023 | 4 | 2023 |
| Millimeter Wave (mmW) Radio Frequency (RF): Active Denial Technologies (ADT): Size Weight Power and Cooling Improvements | 1 | 2017 | 4 | 2018 |
| Millimeter Wave (mmW) Radio Frequency (RF): Active Denial Technologies (ADT): ADM Military Utility Assessment (MUA) | 4 | 2018 | 1 | 2020 |
| Counter Personnel: Long Range Suppression Prototype: Ballistics and qualification testing | 1 | 2017 | 3 | 2020 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0603860N *I JT Precision Approach & Ldg Sys* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 1,026.776 | 102.195 | 106.391 | 101.566 | - | 101.566 | 52.553 | 32.960 | 28.871 | 31.135 | Continuing | Continuing |
| 2329: *JPALS* | 1,026.776 | 102.195 | 106.391 | 101.566 | - | 101.566 | 52.553 | 32.960 | 28.871 | 31.135 | Continuing | Continuing |
| **Program MDAP/MAIS Code:**<br>**Project MDAP/MAIS Code(s):** 238 | | | | | | | | | | | | |

**A. Mission Description and Budget Item Justification**

The FY 2019 funding request was reduced by $.743 million to reflect the Department of Navy's effort to support the Office of Management and Budget directed reforms for Efficiency and Effectiveness that include a lean, accountable, more efficient government.

A. Mission Description and Budget Item Justification

The Joint Precision Approach and Landing System (JPALS) is the primary precision approach and landing system for CVN and LHA/D ships to support aircraft without SPN-46 ACLS capability including F-35B, F-35C, MQ-25A and future platforms. JPALS ship systems are required to provide CVN and LHA/D ships a primary precision approach capability during night and instrument flight conditions, including coupled approach capability to a hover transition point for LHA/D ships, and coupled approach to the deck (auto-land) capability aboard CVN ships. JPALS also provides the over-the-air inertial alignment capability for CVN and LHA/D ships to support aircraft platforms without Link-4A capability, including
F-35, MQ-25A and future platforms. JPALS Early Operational Capability is required to support initial F-35 operational deployments in FY18. JPALS efforts include addressing broadened CyberSecurity requirements to remain compliant with software CyberSecurity directives and Information Assurance mandates.

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under ADVANCED COMPONENT DEVELOPMENT AND PROTOTYPES because it includes all efforts necessary to evaluate integrated technologies, representative models or prototype systems in high fidelity and realistic operating environments.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | Date: February 2018 |
|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | R-1 Program Element (Number/Name)<br>PE 0603860N *I JT Precision Approach & Ldg Sys* | | |
| **B. Program Change Summary ($ in Millions)** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** |
| Previous President's Budget | 104.144 | 106.391 | 103.549 | - | 103.549 |
| Current President's Budget | 102.195 | 106.391 | 101.566 | - | 101.566 |
| Total Adjustments | -1.949 | 0.000 | -1.983 | - | -1.983 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | 1.761 | 0.000 | | | |
| • SBIR/STTR Transfer | -2.288 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | -0.743 | - | -0.743 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -1.240 | - | -1.240 |
| • Congressional Directed Reductions Adjustments | -1.422 | - | - | - | - |

**Change Summary Explanation**

Technical: N/A

Schedule: N/A

Financial: Added additional funds in FY17 to properly price the JPALS Engineering Development Models.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603860N / *JT Precision Approach & Ldg Sys* | Project (Number/Name)<br>2329 / *JPALS* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2329: *JPALS* | 1,026.776 | 102.195 | 106.391 | 101.566 | - | 101.566 | 52.553 | 32.960 | 28.871 | 31.135 | Continuing | Continuing |
| Quantity of RDT&E Articles | | 2 | - | - | - | - | - | - | - | - | | |

**Project MDAP/MAIS Code:** 238

**A. Mission Description and Budget Item Justification**

The restructured Joint Precision Approach and Landing System (JPALS) program (post Nunn-McCurdy certification) completed a successful MS B and entry into the Engineering and Manufacturing Development (EMD) phase in June 2016. This budget reflects the Department of Defense certified Component Cost Position of the restructured JPALS program that funds the developmental, testing, and integration activities to implement and field JPALS ship systems that deliver the primary precision approach, landing, on-deck inertial alignment, surveillance, and auto-land capability for current and future low observable manned and unmanned platforms onboard all CVN and LHA/D ships. JPALS Early Operational Capability (EOC) is required to support initial F-35 operational deployments. JPALS provides for development, integration, installation, and test of JPALS on CVN and LHA/D ships in accordance with the Joint Requirements Oversight Council (JROC) March 2016 approved JPALS Capability Development Document (CDD). JPALS Engineering Development Model (EDM) articles have been delivered to support JPALS EMD activities. JPALS EDMs will be installed at shore based test facilities and (temporarily) on CVN and LHA/D ships to support F-35B/C developmental and operational testing and MQ-25A concept refinement, system requirements identification, allocation, surrogate risk reduction, and test. Two JPALS EDMs will be procured and installed to support testing and F-35 shipboard operational deployments that begin in FY18. JPALS will continue to invest in software development in direct support of precision approach and auto-land capabilities for the F-35B/C, MQ-25A, and future air platforms. JPALS effort includes addressing broadened CyberSecurity requirements to remain compliant with software CyberSecurity directives and Information Assurance mandates.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** JPALS Ship Systems and Test | 96.800 | 100.955 | 95.980 | 0.000 | 95.980 |
| ***Articles:*** | 2 | - | - | - | - |
| ***Description:*** JPALS provides for development, integration, installation, and test of Sea-Based JPALS on CVN and LHA/D ships. | | | | | |
| ***FY 2018 Plans:***<br>Continue JPALS development and test activities in preparation for System Verification Review (SVR) and Production Readiness Review (PRR). Perform JPALS IT-B1 in 2nd quarter and IT-B2/3 in 3rd and 4th quarter. Install cabling, foundations and EDMs on additional LHA/Ds to support F-35B operational deployments and EOC. Support F-35B preparation for and operational deployments. Perform Maintenance Demonstrations (M- | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603860N / *JT Precision Approach & Ldg Sys* | **Project (Number/Name)**<br>2329 / *JPALS* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Demo) in 4th quarter. Address broadened cyber-security requirements to remain compliant with software cyber-security directives and information assurance mandates.<br>***FY 2019 Base Plans:***<br>Attain MS C in 2nd quarter. Perform System Verification Review (SVR) and Integrated Logistics Assessment (ILA) in 1st quarter and Production Readiness Review (PRR) in 2nd quarter. Award LRIP contract in 3rd quarter. Begin Operational Test (OT) in 3rd quarter. Support F-35 operational deployments.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Decrease of $4.975M from FY 2018 to FY 2019 is due to the reduction in developmental test support as the program prepares for Milestone C. | | | | | |
| ***Title:*** Joint Strike Fighter (JSF) F-35B Marine Corp STOVL and F-35C Navy Carrier Variant Support | 3.973 | 3.999 | 4.020 | 0.000 | 4.020 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Provide technical development, shore based, and ship based support for F-35B and F-35C JPALS Integration and Developmental Test (DT) and Operational Test (OT) events. Provide JPALS system certification and<br>documentation to certify shipboard all weather precision approach capability for F-35 operational test and deployments.<br>***FY 2018 Plans:***<br>Support F-35B/C shipboard OT results and analysis. Support preparation for F-35 operational deployments.<br>***FY 2019 Base Plans:***<br>Continue support of F-35 operational deployments including delivery, installation, and ship rider support of the JPALS Early Operational Capability (EOC) units onto ships to support the deployment of the JPALS UDB capable F-35 3F fleet aircraft.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603860N / *JT Precision Approach & Ldg Sys* | **Project (Number/Name)**<br>2329 / *JPALS* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Increase of $0.021M from FY 2018 to FY 2019 is due to inflation. | | | | | |
| ***Title:*** MQ-25 Support | 1.422 | 1.437 | 1.566 | 0.000 | 1.566 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Provide technical support, lab support, requirements identification, allocation and test activities for MQ-25. Support MQ-25 concept refinement, requirements development, integration specifications, and risk reduction activities for JPALS integration. Support MQ-25 concept refinement and JPALS integration and developmental activities.<br><br>***FY 2018 Plans:***<br>Support MQ-25 risk reduction activities, MS B efforts, and continue Engineering and Manufacturing Development phase activities to integrate and test JPALS capabilities.<br><br>***FY 2019 Base Plans:***<br>Provide MQ-25 support to including JPALS algorithm integration support to Aircraft OEM, validation and verification activities supporting the aircraft software development, supporting development of the Patuxent River MQ-25 Systems Integration Lab, and preparation for future testing.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Increase of $0.129M from FY 2018 to FY 2019 is for increased engineering efforts required for JPALS algorithm integration support to the MQ-25 system. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 102.195 | 106.391 | 101.566 | 0.000 | 101.566 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • OPN/2867: *JPALS* | 0.000 | 0.000 | 38.094 | - | 38.094 | 62.391 | 66.226 | 10.277 | 10.496 | 183.207 | 370.691 |

**Remarks**

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603860N / *JT Precision Approach & Ldg Sys* | **Project (Number/Name)**<br>2329 / *JPALS* |

**D. Acquisition Strategy**

Technology Development phase was conducted jointly by NAVAIRSYSCOM (PMA-213), USAF Electronic Systems Command (Global Air) and multiple industry partners. This effort provided the concept of operations, performance specifications and technology readiness levels necessary to provide the foundation from which to launch the Increment 1 System Development and Demonstration (SDD) phase development. Joint Precision Approach and Landing System (JPALS) reached MS-B on 14 July 2008 and the SDD phase development contract was awarded on 17 July 2008. Tasking consisted of sea-based JPALS, related ship and airborne reference systems, end-to-end software algorithms, necessary ship installation hardware, test equipment, system simulation software, and other RDT&E deliverable products. The SDD contract was decided after full and open competition. JPALS is being developed by the Navy with an open system architecture in order to facilitate the compatible integration of many different aircraft and avionics architectures. JPALS provides for development, integration, installation, and test of Sea-Based JPALS to meet Initial Operation Capability of CVN and LHA/D ships in accordance with the JPALS Capability Development Document (CDD). Additionally, this requirement provides critical enabling technology for Joint Strike Fighter (JSF) F-35B Marine Corps Short Take-Off and Vertical Landing (STOVL) and F-35C Navy Carrier Variant, ship-based MQ-25A, and future Navy and Marine Corps air platforms.

As a result of the DON Resource and Requirements Review Board approved PALC Roadmap, the JPALS production phase was deferred to include design improvements to provide manned and unmanned aircraft with autoland capabilities. The current Engineering and Manufacturing Development (EMD) contract was modified in FY14 to add detailed requirements and design trade studies to identify specific system design improvements. An extension for pre-Milestone B efforts was awarded in fourth quarter FY15.

A Development RFP Release Decision Point (DRRDP) Defense Acquisition Board (DAB) was completed and the RFP for JPALS EMD 16 was released on 24 November 2015. A Milestone B (MS B) DAB was completed 02 June 2016. The MS B Acquisition Decision Memorandum (ADM) was approved 27 June 2016, which granted entry into the EMD phase for the restructured JPALS program and officially completed all actions required to exit Nunn-McCurdy. JPALS now has an approved Acquisition Program Baseline (APB) and has been designated an Acquisition Category (ACAT) 1C program. Sole Source contract was awarded to Raytheon in fourth quarter FY16.

**E. Performance Metrics**

Milestone C scheduled for second quarter FY19.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603860N / *JT Precision Approach & Ldg Sys* | **Project (Number/Name)**<br>2329 / *JPALS* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ship Integration | WR | NAWCAD : Pax River, MD | 45.968 | 9.422 | Nov 2016 | 12.482 | Nov 2017 | 12.296 | Nov 2018 | - | | 12.296 | Continuing | Continuing | Continuing |
| Primary Hardware Development - EMD Phase I | C/CPIF | Raytheon : Fullerton, CA | 410.181 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 410.181 | 410.181 |
| Primary Hardware Development - New EMD Contract | C/CPIF | Raytheon : Fullerton, CA | 6.224 | 61.966 | Nov 2016 | 60.693 | Nov 2017 | 60.860 | Nov 2018 | - | | 60.860 | 160.728 | 350.471 | 350.471 |
| JPALS Modifications for ARC-210 | C/CPFF | RCI : Cedar Rapids, IA | 4.772 | 0.332 | Nov 2016 | 0.000 | | 1.849 | Nov 2018 | - | | 1.849 | 1.936 | 8.889 | 8.889 |
| Risk Reduction for Auto-land - FFRDC Support | FFRDC | JHU : Laurel, MD | 0.493 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.493 | - |
| Prior Year Prod Dev no longer funded in the FYDP | TBD | Various : Various | 249.870 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 249.870 | - |
| | | **Subtotal** | 717.508 | 71.720 | | 73.175 | | 75.005 | | - | | 75.005 | Continuing | Continuing | N/A |

**Remarks**

The Primary Hardware Development contract with Raytheon is a CPIF contract. FY17 funding for the ARC210 RCI contract was the completion of previous EMD work. FY19 commences the next phase of ARC-210 modifications required to support JPALS.

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Systems Engineering Support | WR | NAWCAD : Pax River, MD | 159.861 | 15.520 | Nov 2016 | 16.822 | Nov 2017 | 16.375 | Nov 2018 | - | | 16.375 | Continuing | Continuing | Continuing |
| Integrated Logistics Support | WR | NAWCAD : Pax River, MD | 25.301 | 2.582 | Nov 2016 | 2.659 | Nov 2017 | 2.682 | Nov 2018 | - | | 2.682 | Continuing | Continuing | Continuing |
| Prior Year Support Costs non longer funded in FYDP | Various | Various : Various | 21.514 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 21.514 | - |
| | | **Subtotal** | 206.676 | 18.102 | | 19.481 | | 19.057 | | - | | 19.057 | Continuing | Continuing | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603860N / *JT Precision Approach & Ldg Sys* | Project (Number/Name)<br>2329 / *JPALS* | |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Developmental Test & Evaluation | WR | NAWCAD : Pax River, MD | 61.623 | 8.023 | Nov 2016 | 9.044 | Nov 2017 | 2.772 | Nov 2018 | - | | 2.772 | Continuing | Continuing | Continuing |
| Operational Test & Evaluation | WR | COMOPTEVFOR : Norfolk, VA | 3.899 | 0.409 | Nov 2016 | 0.637 | Nov 2017 | 0.638 | Nov 2018 | - | | 0.638 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 65.522 | 8.432 | | 9.681 | | 3.410 | | - | | 3.410 | Continuing | Continuing | N/A |

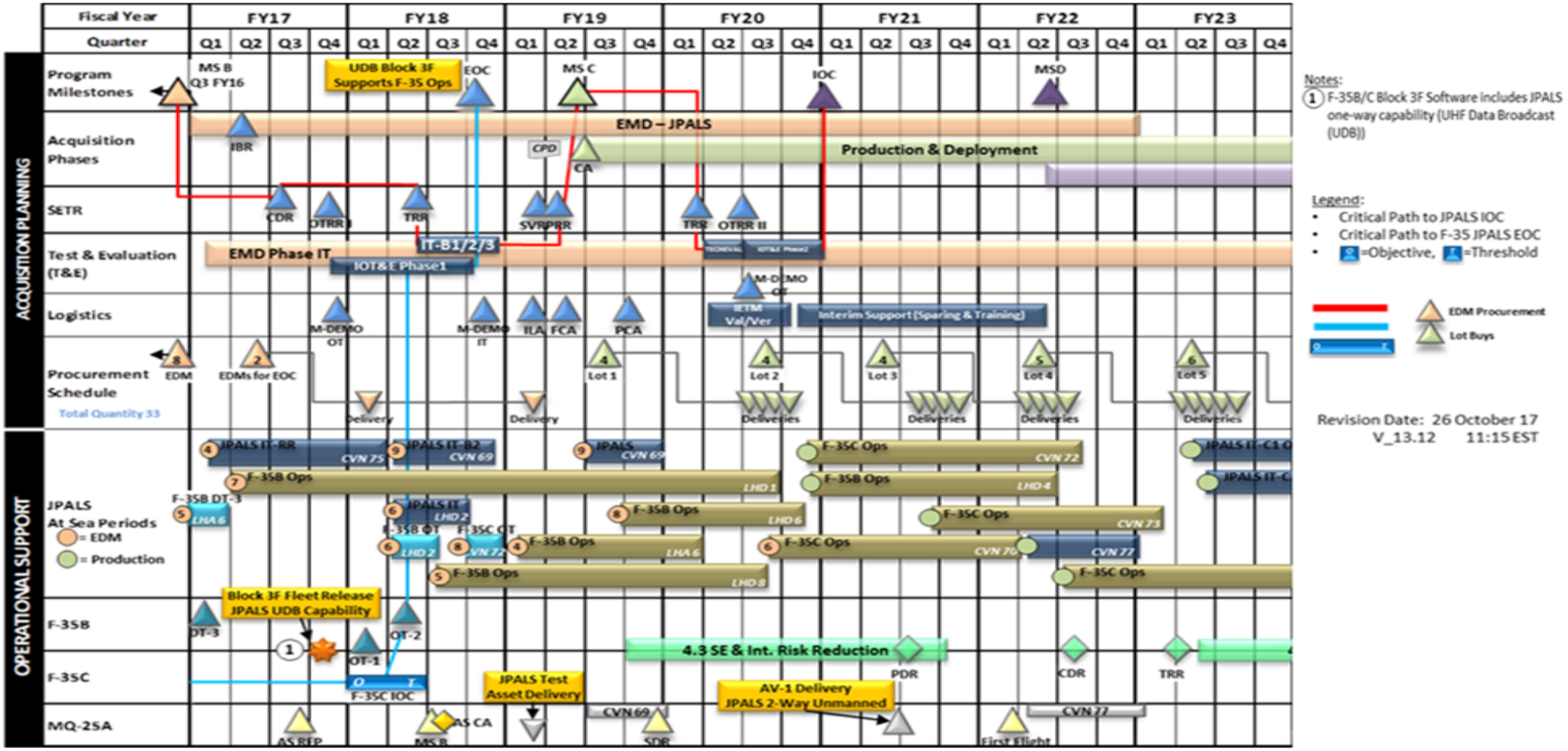
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management Support | WR | NAWCAD : Pax River, MD | 19.781 | 2.936 | Nov 2016 | 3.035 | Nov 2017 | 3.050 | Nov 2018 | - | | 3.050 | Continuing | Continuing | Continuing |
| PM Support-MSS | C/CPFF | Amelex : Pax River, MD | 13.238 | 0.798 | Nov 2016 | 0.808 | Nov 2017 | 0.829 | Nov 2018 | - | | 0.829 | 1.302 | 16.975 | 16.975 |
| PM Support-MSS | C/CPFF | Avian : Pax River, MD | 1.592 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.592 | 1.592 |
| PM Support-MSS | C/CPFF | SAIC : Pax River, MD | 2.207 | 0.139 | Nov 2016 | 0.141 | Nov 2017 | 0.142 | Nov 2018 | - | | 0.142 | 0.182 | 2.811 | 2.811 |
| Travel | WR | NAVAIR : Pax River, MD | 0.252 | 0.068 | Nov 2016 | 0.070 | Nov 2017 | 0.073 | Nov 2018 | - | | 0.073 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 37.070 | 3.941 | | 4.054 | | 4.094 | | - | | 4.094 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 1,026.776 | 102.195 | | 106.391 | | 101.566 | | - | | 101.566 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603860N / *JT Precision Approach & Ldg Sys* | **Project (Number/Name)**<br>2329 / *JPALS* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603860N / *JT Precision Approach & Ldg Sys* | **Project (Number/Name)**<br>2329 / *JPALS* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***JPALS*** | | | | |
| Acquisition Milestones: MS C | 2 | 2019 | 2 | 2019 |
| Acquisition Milestones: Early Operating Capability (EOC) | 4 | 2018 | 4 | 2018 |
| Systems Development: Engineering and Manufacturing Development | 1 | 2017 | 4 | 2022 |
| Systems Development: Reviews: Critical Design Review (CDR) | 3 | 2017 | 3 | 2017 |
| Systems Development: Reviews: System Verification Review (SVR) | 1 | 2019 | 1 | 2019 |
| Systems Development: Reviews: Integrated Logistics Assessment (ILA) | 1 | 2019 | 1 | 2019 |
| Systems Development: Contract Awards: LRIP Contract Award | 3 | 2019 | 3 | 2019 |
| Test & Evaluation: Operational Test and Evaluation (IOT&E) Phase 1 | 2 | 2018 | 1 | 2019 |
| Test & Evaluation: JPALS Operational Test Readiness Review (OTRR) | 2 | 2018 | 2 | 2018 |
| Production Milestones: Production Readiness Review (PRR) | 2 | 2019 | 2 | 2019 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603925N *I Directed Energy and Electric Weapon System* |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Program Element | 100.205 | 34.039 | 107.310 | 223.344 | - | 223.344 | 107.886 | 46.783 | 38.561 | 31.911 | Continuing | Continuing |
| 3370: *Railgun* | 77.679 | 21.737 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 99.416 |
| 3402: *Surface Navy Laser Weapon System (SNLWS)* | 0.000 | 0.000 | 63.281 | 190.237 | - | 190.237 | 89.632 | 44.751 | 36.558 | 29.768 | Continuing | Continuing |
| 9823: *Lasers for Navy applicat* | 22.526 | 12.302 | 44.029 | 33.107 | - | 33.107 | 18.254 | 2.032 | 2.003 | 2.143 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

This program element will transition Directed Energy and Electric Weapon Systems (DE&EWS) technology from Science and Technology (S&T) research to the Technology Maturation and Risk Reduction phase, ultimately leading to acquisition initiation for the Surface/Subsurface Navy.

DE&EWS consist of multiple breakthrough technologies including: laser weapons that provide for speed-of-light engagements at tactically significant ranges resulting in savings realized by minimizing the use of defensive missiles and projectiles; electromagnetic launch of projectiles that will significantly increase firing ranges imposing greater cost to adversaries of ballistic and air defense missile engagements; enhance the land attack mission; and fielding of high power radio frequency systems for non-kinetic electronic attack and active denial technology, allowing for non-lethal determination of threat intent beyond small arms fire ranges.

Development of DE&EWS includes: Weapons Grade High Energy Lasers, Electromagnetic Railgun (EMRG) Weapon Systems, High Power Radio Frequency Weapon/ Sensor Systems, and other systems/capabilities.

Project 3370 - Railgun: EMRG provides ship-based program/technical development to produce a standard railgun/mount for use onboard Navy warships. Railgun provides increased capability for the following mission sets: Naval Surface Fire Support (NSFS), Integrated Air and Missile Defense (IAMD), Fast Attack Craft and Fast Inshore Attack Craft (FAC/FIAC), and future potential for Anti-Surface Warfare (ASuW). EMRG uses electromagnetic energy, vice traditional chemical propellant (i.e. gun powder), to launch projectiles providing: greatly increased range (110+nm vice 13nm for current 5" chemical propellant [gunpowder] guns); increased ammunition storage capacity; increased ship safety; increased layered point defense; and decreased costs when compared to current weapons. The net effect is an increased capacity against multiple simultaneous threats at a lower operational cost to offset a potential adversary's asymmetric missile strategy. The EMRG will launch the Hyper Velocity Projectile (HVP).

Project 3402 - Surface Navy Laser Weapon System (SNLWS): SNLWS funding was provided for the expedited development and fielding of the SNLWS system to Naval Forces. SNLWS includes the development of advanced prototype laser weapon systems in the 60 kW or higher class. SNLWS leverages mature technology to deliver a proven laser weapon capability to the Fleet. SNLWS development leverages the Office of Naval Research (ONR) efforts on the Solid State Laser (SSL) Quick Reaction Capability (QRC) and Solid State Laser (SSL) Technology Maturation (TM) efforts. SNLWS provides a capability to address existing Anti-Surface Warfare, Integrated Air and Missile Defense and Counter-Intelligence, Surveillance and Reconnaissance (C-ISR) Gaps with the ability to dazzle and destroy Unmanned Aerial Systems (UASs) and Fast Inshore Attack Craft (FIAC).

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0603925N *I Directed Energy and Electric Weapon System* |

The funding in PB19 was increased in order to procure two (2) additional SNLWS units for two DDG 51 class ship installations and was based on a certified NAVSEA cost estimate that more accurately predicts actual program costs. This increase provides the requisite level of funding for the system engineering and combat system integration, threat analysis, ship installation/integration/planning/drawings/scheduling, test planning, and maintenance/sustainment engineering/planning for the first two SNLWS units. FY18 efforts are focused on program and system requirements definition, contract proposal development and evaluation, and contract award which will allow procurement of long lead material to maintain the schedule for delivery of the initial SNLWS units.

Project 9823 - Lasers for Navy Applications: Low Power Module (LPM) development will provide near-term, directed energy, shipboard Counter-Intelligence, Surveillance, and Reconnaissance (C-ISR) capabilities to dazzle Unmanned Aerial Systems (UASs) and other platforms that will address urgent operational needs of the Fleet. FY18 is the first year of funding that will support the design, development and procurement of eight standalone units over the FYDP, for deployment on DDG 51 surface combatants. The program will support the non-recurring engineering, development, procurement of long lead material, assembly and checkout, system certification, and platform integration/installation for these eight standalone units.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 32.700 | 107.310 | 117.907 | - | 117.907 |
| Current President's Budget | 34.039 | 107.310 | 223.344 | - | 223.344 |
| Total Adjustments | 1.339 | 0.000 | 105.437 | - | 105.437 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | 1.800 | 0.000 | | | |
| • SBIR/STTR Transfer | -0.461 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | 109.000 | - | 109.000 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -3.563 | - | -3.563 |

**Change Summary Explanation**

The FY19 funding increase in the amount of +$105.437 million reflects the following:

+$109 million Project 3402 - PB19 funding was based on a certified NAVSEA cost estimate that more accurately predicts actual program costs and procures two additional shipboard prototype systems. This increase fully funds SNLWS to the February 2017 cost estimate.

-$3.563 million miscellaneous rate adjustments.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603925N / *Directed Energy and Electric Weapon System* | Project (Number/Name)<br>3370 / *Railgun* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3370: *Railgun* | 77.679 | 21.737 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 99.416 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

EMRG provides ship-based program/technical development to produce a standard railgun/mount for use onboard Navy warships. Railgun provides increased capability for the following mission sets: Naval Surface Fire Support (NSFS), Integrated Air and Missile Defense (IAMD), Fast Attack Craft and Fast Inshore Attack Craft (FAC/FIAC), and future potential for Anti-Surface Warfare (ASuW). EMRG uses electromagnetic energy, vice traditional chemical propellant (i.e. gun powder), to launch projectiles providing: greatly increased range (110+nm vice 13nm for current 5" chemical propellant [gunpowder] guns); increased ammunition storage capacity; increased ship safety; increased layered point defense; and decreased costs when compared to current weapons. The net effect is an increased capacity against multiple simultaneous threats at a lower operational cost to offset a potential adversary's asymmetric missile strategy. The EMRG will launch the Hyper Velocity Projectile (HVP), currently in development as a Future Naval Capability (FNC).

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Railgun | 21.737 | 0.000 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>N/A | | | | | |
| ***FY 2019 Base Plans:***<br>N/A | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 21.737 | 0.000 | 0.000 | 0.000 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603925N / *Directed Energy and Electric Weapon System* | **Project (Number/Name)**<br>3370 / *Railgun* |

**E. Performance Metrics**

N/A

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603925N / *Directed Energy and Electric Weapon System* | **Project (Number/Name)**<br>3370 / *Railgun* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hardware - Test Stand/Pulsed Power/ Power & Energy/ Platform Requirements/ Development | MIPR | BAE, Merrill, Meggitt, Syntek, IAP, GA, ARDEC, Ray : Picatinny Arsenal, NJ | 13.974 | 7.524 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 21.498 | - |
| Hardware - Test Stand/ Platform Requirements/ Development | C/CPFF | GRYPHON, GSA : Washington,D.C., Dahlgren, VA | 2.578 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.578 | - |
| Hardware - Test Stand/ Platform Requirements Development | WR | NSWC DD; NSWC Corona : Dahlgren, VA, Corona, CA | 7.309 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 7.309 | - |
| Hardware - Power Conversion | C/CPFF | NAVSEA PMS 320 Contract,ROLLS ROYCE : Washington, D.C. | 0.085 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.085 | - |
| Hardware - Power Conversion | WR | NAVSSESS : Philadelphia, PA | 1.492 | 1.000 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.492 | - |
| Hardware - Pulsed Power Development | WR | NSWC DD; : Dahlgren, VA | 2.562 | 3.626 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 6.188 | - |
| Hardware - Pulsed Power Development | C/CPFF | NAVSEA, PMS 320, BAE, RAYTHEON : Washington, D.C. | 8.658 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 8.658 | - |
| Hardware - Battery and Charging Supply Development/Certification | C/CPFF | NAVSEA PMS 320 Various : Washington, D.C. | 4.406 | 1.950 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 6.356 | - |
| Hardware - Battery & Charging Supply Dev/Cert | WR | NAVSSES : Philadelphia, PA | 2.100 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.100 | - |
| Hardware - Projectile Development | C/CPFF | Contractor via AFRL, BAE : Rome, NY, Minneapolis, MN | 0.188 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.188 | - |
| Hardware - HVP EM Compatibility | WR | NSWC/DD : Dahlgren, VA | 5.540 | 1.155 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 6.695 | - |
| Hardware - Projectile Development | WR | NSWC/IH : Indian Head, MD | 0.386 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.386 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603925N / *Directed Energy and Electric Weapon System* | Project (Number/Name)<br>3370 / *Railgun* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Software Weapon System | WR | NSWC/DD : Dahlgren, VA | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | - |
| Software Weapon System | C/CPFF | MDA : Redstone Arsenal, AL | 0.700 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.700 | - |
| Software Fire Control System | WR | NSWC/DD, NSWC Corona : Dahlgren, VA, Corona, CA | 3.610 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.610 | - |
| Hardware - Pulsed Power Development | C/CPFF | DTI : NAVSEA 05 | 0.000 | 0.200 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.200 | - |
| Advanced Pulsed Power Swap-C | WR | VAR : VAR | 0.000 | 1.004 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.004 | - |
| Subsystem Technology Assessment | WR | NSWC DD : Dahlgren, VA | 0.000 | 1.125 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.125 | - |
| Tech Maturation of Core Componenets | WR | NSWC DD : Dahlgren, VA | 0.000 | 0.585 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.585 | - |
| | | **Subtotal** | 53.588 | 18.169 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 71.757 | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Systems Engineering/ Management | WR | NSWC/DD : Dahlgren, VA | 6.762 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 6.762 | - |
| System Engineering/ Management | C/CPFF | PSU EOC, BIW, AGS, DTI : Washington, D.C. | 1.436 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.436 | - |
| System Engineering/ Management | WR | NSWC, IH : Indian Head, MD | 0.052 | 0.090 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.142 | - |
| Hypervelocity Projectile Sys Engr/Mgmt | C/CPFF | JHU/APL : Baltimore, MD | 0.780 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.780 | - |
| Hypervelocity Projectile Sys Engr/Mgmt | WR | NSWC CD : Carderock, MD | 0.000 | 0.370 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.370 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603925N / *Directed Energy and Electric Weapon System* | Project (Number/Name)<br>3370 / *Railgun* | |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Systems Engineering/ Management | C/CPFF | Gryphon Technologies : Washington, DC | 0.000 | 0.159 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.159 | - |
| Systems Engineering/ Management | MIPR | COTF/MCOTEA : Norfolk, VA | 0.100 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.100 | - |
| Systems Engineering/ Management | C/CPFF | Lockheed Martin : Various | 0.200 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.200 | - |
| | | **Subtotal** | 9.330 | 0.619 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 9.949 | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Airframe Analysis | WR | NSWC DD, Eglin AFB, Robins AFB : Dahlgren, VA, Robins AFB GA, Eglin AFB | 1.540 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.540 | - |
| WSMR T&E/GFE | WR | NSWC DD : Dahlgren, VA | 1.300 | 0.545 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.845 | - |
| Landbased/Seabased Plan/Install/Conduct | WR | NSWC/DD : Dahlgren, VA, Corona, CA | 1.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.000 | - |
| Power and Energy Test Bed Development | WR | NAVSSESS; AFRL; Eglin : Philadelphia, PA; Washington, D.C. | 2.785 | 0.345 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.130 | - |
| Landbased Test Support | WR | NAVFAC : Jacksonville, FL | 0.104 | 0.000 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.104 | - |
| Landbased Test Support | WR | WSMR : Port Hueneme CA | 1.300 | 0.060 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.360 | - |
| Hypervelocity Projectile | WR | WSMR : Port Hueneme CA | 0.200 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.200 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603925N / *Directed Energy and Electric Weapon System* | **Project (Number/Name)**<br>3370 / *Railgun* |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Subtotal** | 8.229 | 0.950 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 9.179 | N/A |

**Management Services ($ in Millions)**

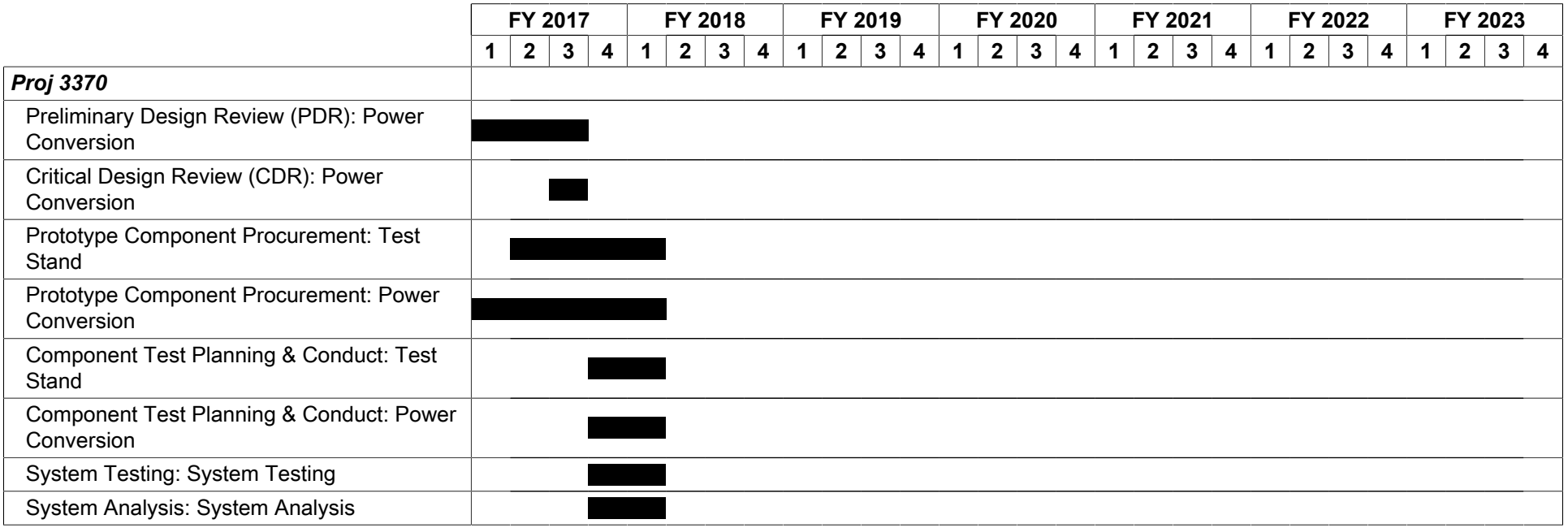
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Project Engineering/ Management | MIPR | ARDEC : Picatinny Arsenal, NJ | 2.175 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.175 | - |
| Project Engineering/ Management | WR | NSWC Dahlgren : Dahlgren, VA | 2.900 | 1.200 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 4.100 | - |
| Project Engineering/ Management | WR | NPS : Monterey, CA | 0.128 | 0.300 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.428 | - |
| Project Engineering/ Management | C/CPFF | ALION/CSC : Washington, D.C. | 0.554 | 0.204 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.758 | - |
| Program Management/ Support | C/CPFF | CACI/ALION : Washington, D.C. | 0.775 | 0.136 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.911 | - |
| Program Management/ Support | C/CPFF | TMB/Kratos : Arlington, VA | 0.000 | 0.159 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.159 | - |
| | | **Subtotal** | 6.532 | 1.999 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 8.531 | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 77.679 | 21.737 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 99.416 | N/A |

**Remarks**

- Award Date reflects month of the most recent contract modification or incremental payment.

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603925N / *Directed Energy and Electric Weapon System* | **Project (Number/Name)**<br>3370 / *Railgun* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603925N / *Directed Energy and Electric Weapon System* | **Project (Number/Name)**<br>3370 / *Railgun* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3370*** | | | | |
| Preliminary Design Review (PDR): Power Conversion | 1 | 2017 | 3 | 2017 |
| Critical Design Review (CDR): Power Conversion | 3 | 2017 | 3 | 2017 |
| Prototype Component Procurement: Test Stand | 2 | 2017 | 1 | 2018 |
| Prototype Component Procurement: Power Conversion | 1 | 2017 | 1 | 2018 |
| Component Test Planning & Conduct: Test Stand | 4 | 2017 | 1 | 2018 |
| Component Test Planning & Conduct: Power Conversion | 4 | 2017 | 1 | 2018 |
| System Testing: System Testing | 4 | 2017 | 1 | 2018 |
| System Analysis: System Analysis | 4 | 2017 | 1 | 2018 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603925N / *Directed Energy and Electric Weapon System* | Project (Number/Name)<br>3402 / *Surface Navy Laser Weapon System (SNLWS)* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3402: *Surface Navy Laser Weapon System (SNLWS)* | 0.000 | 0.000 | 63.281 | 190.237 | - | 190.237 | 89.632 | 44.751 | 36.558 | 29.768 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Project 3402 - Surface Navy Laser Weapon System (SNLWS): SNLWS funding was provided for the expedited development and fielding of the SNLWS system to Naval Forces. SNLWS includes the development of advanced prototype laser weapon systems in the 60 kW or higher class. SNLWS leverages mature technology to deliver a proven laser weapon capability to the Fleet. SNLWS development leverages the Office of Naval Research (ONR) efforts on the Solid State Laser (SSL) Quick Reaction Capability (QRC) and Solid State Laser (SSL) Technology Maturation (TM) efforts. SNLWS provides a capability to address existing Anti-Surface Warfare, Integrated Air and Missile Defense and Counter-Intelligence, Surveillance and Reconnaissance (C-ISR) Gaps with the ability to dazzle and destroy Unmanned Aerial Systems (UASs) and Fast Inshore Attack Craft (FIAC).

The funding in PB19 was increased in order to procure two (2) additional SNLWS units for two DDG 51 class ship installations and was based on a certified NAVSEA cost estimate that more accurately predicts actual program costs. This increase provides the requisite level of funding for the system engineering and combat system integration, threat analysis, ship installation/integration/planning/drawings/scheduling, test planning, and maintenance/sustainment engineering/planning for the first two SNLWS units. FY18 efforts are focused on program and system requirements definition, contract proposal development and evaluation, and contract award which will allow procurement of long lead material to maintain the schedule for delivery of the initial SNLWS units.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** SNLWS Development | 0.000 | 36.104 | 160.783 | 0.000 | 160.783 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>- Initiate SNLWS development. This includes system hardware and software design and documentation development; non-recurring system/sub-system/component engineering and management; and component/sub-system procurement, assembly, and testing.<br>- Conduct systems engineering efforts for laser, mount, beam transport, power and cooling, and systems/ ship integration. Perform functional decomposition of the system level documentation into sub-system level requirements for the laser, weapon mount, beams control architecture and transport system, power and cooling sub system and ship interface requirements, and conduct review<br>- Conduct System Requirements Review of system design and interfaces<br>- Conduct System Functional Review of system/subsystem specifications and interfaces | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603925N / *Directed Energy and Electric Weapon System* | **Project (Number/Name)**<br>3402 / *Surface Navy Laser Weapon System (SNLWS)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Initiate development of Preliminary Design Data/Package<br>- Conduct SNLWS Technical Interchange Meetings (TIMs) with PEO IWS and designated field activities.<br>- Provide programmatic and engineering support to SNLWS Integrated Product Teams (IPTs) and Working Groups (WGs).<br>- Initiate procurement of the following long lead material for two systems: Lasers/Mirrors which includes Lasers, Fiber Amplifiers, Tracking Illuminator, Mirrors (primary & secondary); and Beam Director/Optics which includes Beam Director, Exit Windows, Optics/Optical Bench.<br>- Develop and deliver required contract deliverables/documentation. | | | | | |
| ***FY 2019 Base Plans:***<br>- Continue SNLWS development. This includes creating an A-Specification which meets the requirements in the System Scope Document (SSD); conducting systems engineering efforts for laser, mount, beam transport, power and cooling, and systems/ship integration; initiating system design that meets the A-Specification and Government furnished external (Mechanical, Electrical, and Logical) interface requirements and ship integration study requirements; initiating functional decomposition of the system level documentation into sub-system level requirements for the laser, weapon mount, beams control architecture and transport system, power and cooling sub system and ship interface requirements.<br>- Develop Interface Functional Descriptions (IFDs) for the combat system baseline.<br>- Develop system level control and combat system interface software.<br>- Continue development of Preliminary Design/Technical Data Package consisting of: design documentation; non-recurring system/sub-system/component engineering and management; and component/sub-system procurement, assembly, and testing.<br>- Conduct SNLWS Technical Interchange Meetings (TIMs) with PEO IWS and designated field activities.<br>- Provide programmatic and engineering support to SNLWS Integrated Product Teams (IPTs) and Working Groups (WGs).<br>- Conduct Preliminary Design Review to provide a technical assessment of the system architecture and preliminary system design and establish the allocated baseline.<br>- Continue procurement of materials as for the first two systems to include: Mount, Computer Systems, Cables/ Connectors, Cameras/Illuminators, Laser Structure/Foundation, Power/Cooling Mod Kits, and Platform Mod Kits.<br>- Receive and integrate Laser Weapon Control System (LWCS) and Laser Fire Control System (LFCS) GFE into final system design.<br>- Conduct Critical Design Review to assess the system detailed design prior to fabrication of hardware and coding of software. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603925N / *Directed Energy and Electric Weapon System* | **Project (Number/Name)**<br>3402 / *Surface Navy Laser Weapon System (SNLWS)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Conduct Production Readiness Review to determine if the design is ready for production and if the contractor has accomplished adequate production planning.<br>- Prepare for conduct of system Test Readiness Review to determine if SNLWS is ready to proceed into formal testing by verifying test procedures are complete and are in compliance with approved test plans.<br>- Continue fabrication of two units, each consisting of a High Energy Laser Weapon System combined with a C-ISR capability for countering UAS-mounted sensors.<br>- Initiate procurement of long lead material for two additional units: Lasers/Mirrors which includes Lasers, Fiber Amplifiers, Tracking Illuminator, Mirrors (primary & secondary); and Beam Director/Optics which includes Beam Director, Exit Windows, Optics/Optical Bench.<br>- Develop and deliver required contract deliverables/documentation.<br>***FY 2019 OCO Plans:***<br>N/A.<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Funding increased in FY19 to procure two (2) additional SNLWS units for two DDG 51 class ship installations based on a certified NAVSEA cost estimate that more accurately predicts actual program costs. The FY19 increase provides the requisite level of funding for the system engineering and combat system integration, threat analysis, ship installation/integration planning/drawings/scheduling, test planning, and maintenance/sustainment engineering/planning for the first two SNLWS units as well as the additional two SNLWS units in accordance with the adjudicated/approved NAVSEA cost estimates. FY18 efforts are focused on program and system requirements definition, contract proposal development and evaluation, and a 3rd quarter contract award which will allow procurement of long lead material to maintain the schedule for delivery of the initial SNLWS units. | | | | | |
| ***Title:*** SNLWS Government and Support Engineering Services | 0.000 | 27.177 | 29.454 | 0.000 | 29.454 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>- Conduct reviews of Requests For Proposals received from industry and conduct Source Selection.<br>- Develop and award SNLWS Increment 1 contract.<br>- Support System Requirements Review conducted by the prime contractor of system/subsystem specifications and interfaces.<br>- Support System Functional Review conducted by the prime contractor of system design and interfaces.<br>- Support Preliminary Design Review (PDR) engineering and analysis efforts leading up to conduct of the formal PDR. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603925N / *Directed Energy and Electric Weapon System* | **Project (Number/Name)**<br>3402 / *Surface Navy Laser Weapon System (SNLWS)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Initiate AEGIS Combat System software development and integration planning, trade studies and engineering.<br>- Initiate DDG 51 Flight IIA Ship Integration & Installation requirements, trade studies and engineering.<br>- Provide engineering support of the contractor development of Interface Functional Descriptions (IFDs) for the appropriate combat system baseline.<br>- Initiate test planning, test facility scheduling, provision of test assets, and test procedure scoping/development to ensure traceability to system requirements to support requisite system testing upon receipt of system from the contractor.<br>- Initiate hardware/software development/build of Laser Weapon Control System (LWCS) and Laser Fire Control System (LFCS) to be provided as government furnished equipment (GFE).<br>- Review, comment, approve all contractor developed and delivered contract cost, schedule, and performance related documentation. | | | | | |
| ***FY 2019 Base Plans:***<br>- Support all management/technical efforts required in support of Preliminary Design Review (PDR) efforts leading up to and conducting the formal PDR.<br>- Support all management/technical efforts required in support of Critical Design Review (CDR) efforts leading up to and conducting the formal CDR.<br>- Continue review of all contractor provided engineering, design, production readiness, and test documentation.<br>- Conduct Technical Interchange Meetings (TIMs) with contractor and government personnel.<br>- Provide programmatic and engineering support to government-led Integrated Product Teams (IPTs) and Working Groups (WGs).<br>- Conduct Production Readiness Review for contractor developed components/subsystems/system.<br>- Complete hardware/software build of LWCS and provide to contractor as GFE.<br>- Complete build of the LFCS and provide to contractor as GFE.<br>- Exercise contract option for provision of two additional units.<br>- Continue AEGIS Combat System software engineering, development, and integration; conduct Levels 1-5 integration and testing.<br>- Continue DDG 51 Flight IIA Ship Integration and Installation engineering ship data package development, review, and approval.<br>- Finalize test plans, procedures, and schedules that ensure traceability to system requirements as part of required contractor testing.<br>- Support efforts leading up to the Test Readiness Review for contractor developed components/subsystems/ systems. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603925N / *Directed Energy and Electric Weapon System* | **Project (Number/Name)**<br>3402 / *Surface Navy Laser Weapon System (SNLWS)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Review/comment/approve deliverables provided by the contractor.<br>- Develop and deliver programmatic and technical documentation to support the Rapid Prototyping, Experimentation, and Demonstration (RPED) initiative and all requisite cost, schedule, and performance reporting requirements.<br>***FY 2019 OCO Plans:***<br>N/A.<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Increased funding in FY19 funds the government to provide oversight of the prime contractor, validate the contractor's design to meet technical and performance requirements, ensure production readiness, and to incrementally integrate the laser capability into the AEGIS Combat System to include threat analysis, modeling and simulation, and planning of test assets and target assets for verification of system capabilities by the contractor. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 63.281 | 190.237 | 0.000 | 190.237 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The SNLWS is an initiative that provides for industry-developed and government integrated capability to the Fleet in as short a timeframe as possible. Competition is utilized for system development and prototype production efforts. The acquisition strategy permits accelerated fielding of laser weapon systems in the Fleet.

**E. Performance Metrics**

- Conduct SNLWS Source Selection.
- Award SNLWS contract.
- Conduct System Requirements Review.
- Conduct System Functional Review.
- Develop/deliver Laser Weapon Control System (LWCS) as GFE.
- Conduct Preliminary Design Review.
- Conduct Final Design Review.
- Develop/deliver Laser Fire Control System (LFCS) as GFE.
- Conduct Production Readiness Review.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603925N / *Directed Energy and Electric Weapon System* | **Project (Number/Name)**<br>3402 / *Surface Navy Laser Weapon System (SNLWS)* |

- Conduct T&E review for Contractor Test.
- Conduct Contractor Test.
- Deliver Test Units.
- Install, Develop, Test & Operate delivered system.
- Sustain delivered systems.
- Initiate Combat System Integration & DDG 51 Flight IIA Integration/Installation Engineering.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603925N / *Directed Energy and Electric Weapon System* | Project (Number/Name)<br>3402 / *Surface Navy Laser Weapon System (SNLWS)* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SNLWS Development | C/CPIF | Contractor TBD : TBD | 0.000 | 0.000 | | 36.104 | Apr 2018 | 160.783 | Apr 2019 | - | | 160.783 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 36.104 | | 160.783 | | - | | 160.783 | Continuing | Continuing | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SNLWS Systems Engineering, Program Management, GFE/GFI | WR | NSWC Dahlgren : Dahlgren, VA | 0.000 | 0.000 | | 15.561 | Nov 2017 | 13.586 | Nov 2018 | - | | 13.586 | Continuing | Continuing | Continuing |
| SNLWS Ship Installation Documentation | C/CPAF | BIW : Bath, ME | 0.000 | 0.000 | | 1.171 | Feb 2018 | 2.311 | Feb 2019 | - | | 2.311 | Continuing | Continuing | Continuing |
| SNLWS Combat System Integration | C/CPFF | Lockheed Martin : Moorestown, NJ | 0.000 | 0.000 | | 2.813 | Oct 2017 | 2.870 | Feb 2019 | - | | 2.870 | Continuing | Continuing | Continuing |
| SNLWS Systems Engineering | WR | NSWC Crane : Crane, IN | 0.000 | 0.000 | | 0.597 | Nov 2017 | 0.984 | Nov 2018 | - | | 0.984 | Continuing | Continuing | Continuing |
| SNLWS Systems Engineering | WR | NSWC PHD : Port Hueneme, CA | 0.000 | 0.000 | | 0.733 | Nov 2017 | 1.038 | Nov 2018 | - | | 1.038 | Continuing | Continuing | Continuing |
| SNLWS Systems Engineering | WR | SSC PAC : San Diego, CA | 0.000 | 0.000 | | 0.146 | Nov 2017 | 0.150 | Nov 2018 | - | | 0.150 | Continuing | Continuing | Continuing |
| SNLWS Systems Engineering | WR | NPS : Monetrey, CA | 0.000 | 0.000 | | 0.200 | Nov 2017 | 0.210 | Nov 2018 | - | | 0.210 | Continuing | Continuing | Continuing |
| SNLWS Systems Engineering | MIPR | MIT LL : Lexington, MA | 0.000 | 0.000 | | 0.150 | Jan 2018 | 0.160 | Dec 2018 | - | | 0.160 | Continuing | Continuing | Continuing |
| SNLWS Systems Engineering | C/CPFF | PSU EOC : Freeport, PA | 0.000 | 0.000 | | 0.500 | Feb 2018 | 1.421 | Dec 2018 | - | | 1.421 | Continuing | Continuing | Continuing |
| SNLWS Technical Director | WR | NSWC Crane : Crane, IN | 0.000 | 0.000 | | 0.280 | Nov 2017 | 0.300 | Nov 2018 | - | | 0.300 | Continuing | Continuing | Continuing |
| SNLWS Product Support | WR | NSWC PHD : Port Hueneme, CA | 0.000 | 0.000 | | 0.182 | Nov 2017 | 0.600 | Nov 2018 | - | | 0.600 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 22.333 | | 23.630 | | - | | 23.630 | Continuing | Continuing | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603925N / *Directed Energy and Electric Weapon System* | Project (Number/Name)<br>3402 / *Surface Navy Laser Weapon System (SNLWS)* | |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SNLWS Test & Evaluation | WR | SSC PAC : San Diego, CA | 0.000 | 0.000 | | 0.354 | Nov 2017 | 0.424 | Nov 2018 | - | | 0.424 | Continuing | Continuing | Continuing |
| SNLWS Test & Evaluation | WR | NSWC PHD : Port Hueneme, CA | 0.000 | 0.000 | | 0.522 | Nov 2017 | 0.506 | Nov 2018 | - | | 0.506 | Continuing | Continuing | Continuing |
| SNLWS Test & Evaluation | WR | NSWC Crane : Crane, IN | 0.000 | 0.000 | | 0.250 | Nov 2017 | 0.415 | Nov 2018 | - | | 0.415 | Continuing | Continuing | Continuing |
| SNLWS Test & Evaluation | WR | NSWC Dahlgren : Dahlgren, VA | 0.000 | 0.000 | | 1.329 | Nov 2017 | 1.381 | Nov 2018 | - | | 1.381 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 2.455 | | 2.726 | | - | | 2.726 | Continuing | Continuing | N/A |

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SNLWS Program Management/Engineering Support | C/CPFF | GRYPHON Technologies : Washington, D.C. | 0.000 | 0.000 | | 0.927 | Feb 2018 | 1.378 | Dec 2018 | - | | 1.378 | Continuing | Continuing | Continuing |
| SNLWS Program Management/Engineering Support | C/CPIF | SPA : Washington, D.C. | 0.000 | 0.000 | | 0.950 | Dec 2017 | 1.020 | Dec 2018 | - | | 1.020 | Continuing | Continuing | Continuing |
| SNLWS Travel | Various | NAVSEA : Washington, D.C. | 0.000 | 0.000 | | 0.150 | Feb 2018 | 0.200 | Feb 2019 | - | | 0.200 | Continuing | Continuing | Continuing |
| SNLWS Program Management | C/CPFF | TMB : Washington, D.C. | 0.000 | 0.000 | | 0.162 | Dec 2017 | 0.300 | Dec 2018 | - | | 0.300 | Continuing | Continuing | Continuing |
| SNLWS Program Management | C/CPFF | Strategic Insight : Washington, D.C. | 0.000 | 0.000 | | 0.200 | Feb 2018 | 0.200 | Dec 2018 | - | | 0.200 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 2.389 | | 3.098 | | - | | 3.098 | Continuing | Continuing | N/A |

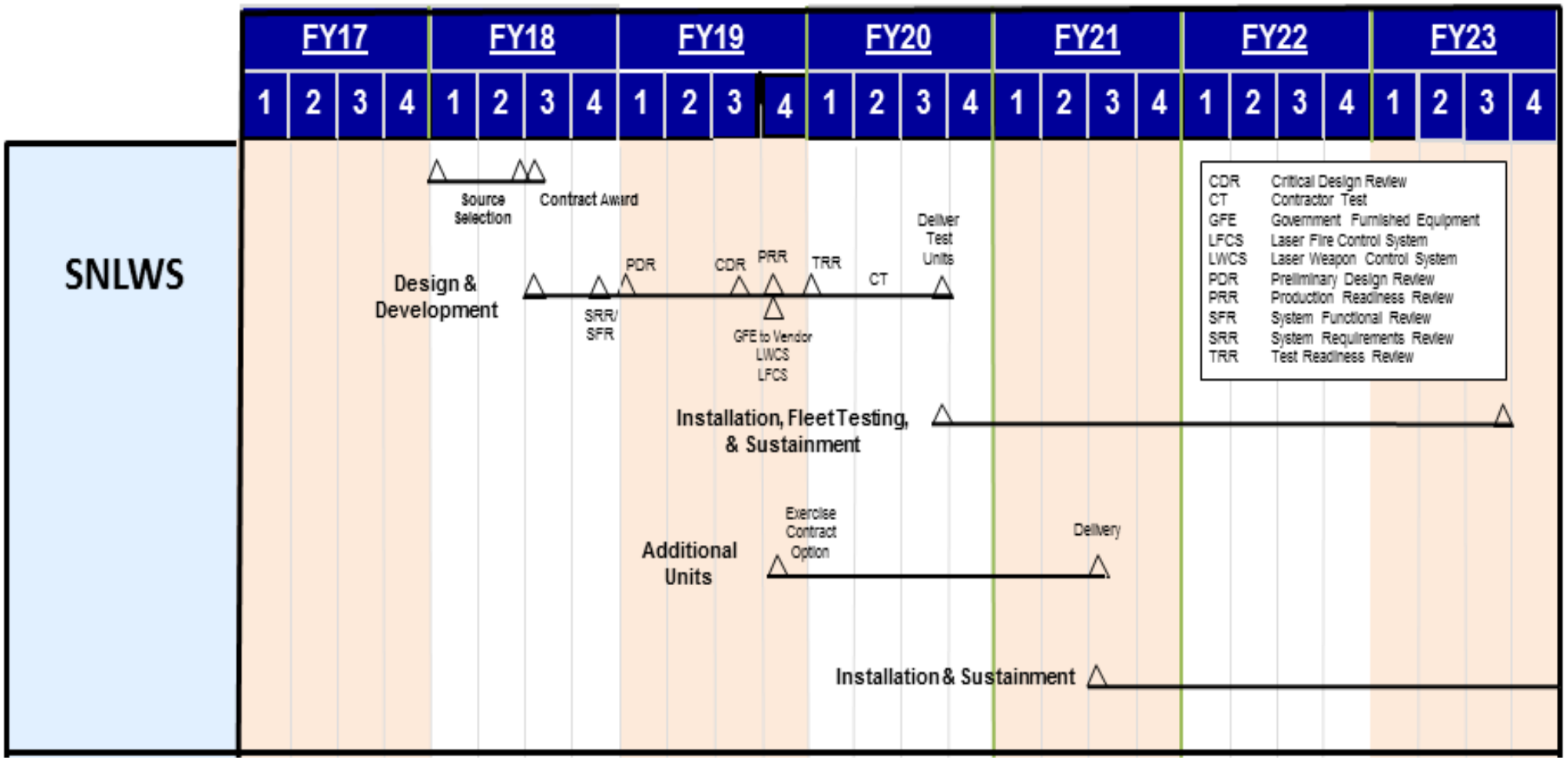
| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 63.281 | | 190.237 | | - | | 190.237 | Continuing | Continuing | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603925N / *Directed Energy and Electric Weapon System* | Project (Number/Name)<br>3402 / *Surface Navy Laser Weapon System (SNLWS)* | |

| | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603925N / *Directed Energy and Electric Weapon System* | **Project (Number/Name)**<br>3402 / *Surface Navy Laser Weapon System (SNLWS)* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603925N / *Directed Energy and Electric Weapon System* | **Project (Number/Name)**<br>3402 / *Surface Navy Laser Weapon System (SNLWS)* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3402*** | | | | |
| SNLWS: Conduct SNLWS Source Selection | 1 | 2018 | 2 | 2018 |
| SNLWS: Contract Award | 3 | 2018 | 3 | 2018 |
| SNLWS: Conduct System Requirements Review/System Functional Review | 4 | 2018 | 4 | 2018 |
| SNLWS: Preliminary Design Review | 1 | 2019 | 1 | 2019 |
| SNLWS: Critical Design Review | 3 | 2019 | 3 | 2019 |
| SNLWS: Laser Weapon Control System (LWCS) GFE to Vendor | 4 | 2019 | 4 | 2019 |
| SNLWS: Laser Fire Control System (LFCS) GFE to Vendor | 4 | 2019 | 4 | 2019 |
| SNLWS: Production Readiness Review (PDR) | 4 | 2019 | 4 | 2019 |
| SNLWS: Exercise Contract Option | 4 | 2019 | 4 | 2019 |
| SNLWS: Test Readiness Review | 1 | 2020 | 1 | 2020 |
| SNLWS: Contractor Test | 1 | 2020 | 3 | 2020 |
| SNLWS: Deliver Test Units | 3 | 2020 | 3 | 2020 |
| SNLWS: Installation, Fleet Testing and Sustainment | 3 | 2020 | 3 | 2023 |
| SNLWS: Deliver Option Units | 3 | 2021 | 3 | 2021 |
| SNLWS: Installation and Sustainment | 3 | 2021 | 4 | 2023 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603925N / *Directed Energy and Electric Weapon System* | Project (Number/Name)<br>9823 / *Lasers for Navy applicat* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9823: *Lasers for Navy applicat* | 22.526 | 12.302 | 44.029 | 33.107 | - | 33.107 | 18.254 | 2.032 | 2.003 | 2.143 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Project 9823 - Lasers for Navy Applications: Low Power Module (LPM) development will provide near-term, directed energy, shipboard Counter-Intelligence, Surveillance, and Reconnaissance (C-ISR) capabilities to dazzle Unmanned Aerial Systems (UASs) and other platforms that will address urgent operational needs of the Fleet. FY18 is the first year of funding that will support the design, development and procurement of eight standalone units over the FYDP, for deployment on DDG 51 surface combatants. The program will support the non-recurring engineering, development, procurement of long lead material, assembly and checkout, system certification, and platform integration/installation for these eight standalone units.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Low Power Module (LPM) Development | 12.302 | 44.029 | 33.107 | 0.000 | 33.107 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** Beginning in FY 2018, Low Power Module (LPM) development efforts are being renamed Optical Dazzling Interdictor, Navy (ODIN). | | | | | |
| ***FY 2018 Plans:***<br>- Complete System Engineering of initial design and initiate the detailed design of a train and elevation capability, pointing/tracking mount and associated hardware/software, and beam control software.<br>- Conduct Technical Design Reviews for system subassemblies.<br>- Procure/integrate sensor components (track illumination laser and Battle Damage Assessment (BDA) laser) for Units 1 and 2.<br>- Procure and initiate build Units 3, 4, 5.<br>- Conduct shipboard integration/installation engineering/documentation for DDG 51 class ships.<br>- Perform Assembly and Checkout of Units 1 and 2.<br>- Each unit consists of: Beam Director (Telescope, Optics, Fast Steering Mirrors); Lower Power Lasers (2); Sensors (Coarse Track, Fine Track, ISR Imaging); Computer Rack, Network Switches; and an Operator Laptop. | | | | | |
| ***FY 2019 Base Plans:***<br>- Complete system integration, test and certifications, including electromagnetic interference, system operability, and safety.<br>- Complete shipboard documentation and training for ships' crew. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603925N / *Directed Energy and Electric Weapon System* | **Project (Number/Name)**<br>9823 / *Lasers for Navy applicat* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Install Units 1 and 2 onboard designated DDG 51 class ships, conduct system turnover, and support shipboard operations.<br>- Complete procurement and build of Units 3, 4, 5.<br>- Perform Assembly and Checkout, and integration of Units 3, 4, 5.<br>- Install Units 3, 4, and 5 onboard designated DDG 51 class ships and initiate shipboard test and checkout.<br>- Procure and initiate build of Units 6, 7, 8.<br>- Each unit consists of: Beam Director (Telescope, Optics, Fast Steering Mirrors); Lower Power Lasers (2); Sensors (Coarse Track, Fine Track, ISR Imaging); Computer Rack, Network Switches; and an Operator Laptop.<br>***FY 2019 OCO Plans:***<br>N/A.<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Funding decreased in FY19 as the majority of the engineering development and initiation of material procurement for production of the initial five (5) systems is accomplished in FY18. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 12.302 | 44.029 | 33.107 | 0.000 | 33.107 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The LPM Stand Alone is a government designed, developed, and produced system that will provide eight units for use on DDG 51 class ships. This effort will transition the developed LPM capabilities to the Fleet, while informing the development of future prototyping capabilities and program of record efforts.

**E. Performance Metrics**

- Conduct Systems Requirements Review
- Conduct Engineering/Program Review
- Conduct Design Review
- Conduct Prototype Testing/Analysis Review
- Conduct Test Plan Review
- Conduct Integration & Testing Review
- Conduct Analysis and Final Report Review
- Produce and install eight units (2 to be installed in FY19, 3 in FY20, and 3 in FY21)

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603925N / *Directed Energy and Electric Weapon System* | **Project (Number/Name)**<br>9823 / *Lasers for Navy applicat* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LPM Development | WR | NSWC DD : Dahlgren, VA | 4.840 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| LPM Development | WR | SSC PAC : San Diego, CA | 1.088 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| LPM Development | WR | NSWC CRANE : Crane, IN | 1.520 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| LPM Development | WR | NRL : Washington, D.C. | 0.470 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| LPM Development | C/CPFF | BOEING : San Diego, CA | 1.349 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Testbed | WR | NSWC DD : Dahlgren, VA | 2.727 | 0.952 | May 2017 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Testbed | C/CPFF | PSU EOC : Freeport, PA | 1.000 | 0.500 | Jul 2017 | 1.560 | Feb 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Hardware & Software - Material Buys | C/FFP | NSWC DD : Dahlgren, VA | 0.000 | 0.000 | | 20.836 | Dec 2017 | 14.461 | Dec 2018 | - | | 14.461 | Continuing | Continuing | Continuing |
| Engineering/Development | WR | NSWC DD : Dahlgren, VA | 0.274 | 2.748 | May 2017 | 7.037 | Nov 2017 | 4.362 | Nov 2018 | - | | 4.362 | Continuing | Continuing | Continuing |
| Software Development | WR | NSWC DD : Dahlgren, VA | 0.000 | 0.000 | | 4.294 | Nov 2017 | 3.958 | Nov 2018 | - | | 3.958 | Continuing | Continuing | Continuing |
| Engineering Development | C/CPFF | PSU EOC : Freeport, PA | 0.000 | 0.000 | | 0.780 | Feb 2018 | 0.350 | Dec 2018 | - | | 0.350 | Continuing | Continuing | Continuing |
| Engineering/Development | WR | NSWC PHD : Port Hueneme, CA | 0.000 | 0.155 | Jul 2017 | 0.330 | Nov 2017 | 0.200 | Nov 2018 | - | | 0.200 | Continuing | Continuing | Continuing |
| Engineering/Development | WR | NSWC Crane : Crane, IN | 0.000 | 0.000 | | 0.500 | Nov 2017 | 0.200 | Nov 2018 | - | | 0.200 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 13.268 | 4.355 | | 35.337 | | 23.531 | | - | | 23.531 | Continuing | Continuing | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603925N / *Directed Energy and Electric Weapon System* | Project (Number/Name)<br>9823 / *Lasers for Navy applicat* | |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Systems/Mgmt Engineering | C/CPFF | PSU EOC : Freeport, PA | 1.724 | 0.700 | May 2017 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Modeling & Simulation | WR | NSWC DD : Dahlgren, VA | 0.399 | 0.560 | May 2017 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Systems/Mgmt Engineering | WR | PATUXENT PARTNERSHIP : Lexington Park, MD | 0.202 | 0.142 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Systems/Mgmt Engineering | C/CPFF | CSC : Washington, D.C. | 0.080 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Systems/Mgmt Engineering | C/CPFF | NAVFAC : Washington, D.C. | 0.000 | 0.125 | Sep 2017 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Spares | WR | NSWC DD : Dalhgren, VA | 0.000 | 0.000 | | 0.711 | Nov 2017 | 0.811 | Nov 2018 | - | | 0.811 | Continuing | Continuing | Continuing |
| Platform Integration/ILS | WR | NSWC DD : Dahlgren, VA | 0.519 | 1.495 | May 2017 | 2.328 | Nov 2017 | 1.771 | Nov 2018 | - | | 1.771 | Continuing | Continuing | Continuing |
| Platform Integration | C/CPAF | BIW : Bath, ME | 0.000 | 0.030 | Jan 2018 | 0.107 | Feb 2018 | 0.155 | Feb 2019 | - | | 0.155 | Continuing | Continuing | Continuing |
| Platform Integration | WR | NSWC CARDEROCK : Bethesda, MD | 0.240 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Platform Integration | C/CPFF | Huntington, Ingalls : Newport News, VA | 0.012 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Platform Integration | C/CPFF | Lockheed Martin : Moorestown, NJ | 0.000 | 0.000 | | 0.265 | Feb 2018 | 0.270 | Feb 2019 | - | | 0.270 | Continuing | Continuing | Continuing |
| Systems Engineering | WR | SSC PAC : San Diego, CA | 0.000 | 0.140 | Jul 2017 | 0.770 | Nov 2017 | 0.550 | Nov 2018 | - | | 0.550 | Continuing | Continuing | Continuing |
| Safety, Product Support, Security & Operations | WR | NSWC Dahlgren : Dahlgren, VA | 2.514 | 1.098 | May 2017 | 1.615 | Nov 2017 | 2.300 | Nov 2018 | - | | 2.300 | Continuing | Continuing | Continuing |
| Platform Integration | WR | NSWC Crane : Crane, IN | 0.000 | 0.000 | | 0.220 | Nov 2017 | 0.250 | Nov 2018 | - | | 0.250 | Continuing | Continuing | Continuing |
| Packaging, Handling, Storage & Transportation, De-Install, Refurbishment | C/FFP | PSU EOC : Freeport, PA | 0.000 | 0.425 | Nov 2017 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0603925N / *Directed Energy and Electric Weapon System* | Project (Number/Name)<br>9823 / *Lasers for Navy applicat* | |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Platform Integration/ILS | WR | NSWC PHD : Port Hueneme, CA | 0.000 | 0.000 | | 1.430 | Nov 2017 | 0.450 | Nov 2018 | - | | 0.450 | Continuing | Continuing | Continuing |
| Packaging, Handling, Storage & Transportation, De-Install, Refurbishment | WR | NSWC DD : Dahlgren, VA | 0.000 | 1.155 | Aug 2017 | 0.088 | Nov 2017 | 0.091 | Nov 2018 | - | | 0.091 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 5.690 | 5.870 | | 7.534 | | 6.648 | | - | | 6.648 | Continuing | Continuing | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Test Planning & Execution | WR | PHD NSWC : Port Hueneme, CA | 0.455 | 0.150 | May 2017 | 0.275 | Nov 2017 | 0.998 | Nov 2018 | - | | 0.998 | Continuing | Continuing | Continuing |
| Test Planning & Execution | WR | NSWC DD : Dahlgren, VA | 1.347 | 0.750 | May 2017 | 0.370 | Nov 2017 | 1.098 | Nov 2018 | - | | 1.098 | Continuing | Continuing | Continuing |
| Test Planning & Execution | WR | NSWC Crane : Crane, IN | 0.292 | 0.330 | Feb 2017 | 0.000 | | 0.250 | Nov 2018 | - | | 0.250 | Continuing | Continuing | Continuing |
| Test Planning & Execution | MIPR | Kirtland AFB : Albuquerque, NM | 0.045 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Test Planning & Execution | WR | SSC PAC : San Diego, CA | 0.000 | 0.000 | | 0.000 | | 0.100 | Nov 2018 | - | | 0.100 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 2.139 | 1.230 | | 0.645 | | 2.446 | | - | | 2.446 | Continuing | Continuing | N/A |

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Mgmt/Support | C/CPFF | GRYPHON Technologies : Washington, D.C. | 0.178 | 0.320 | Jul 2017 | 0.250 | Mar 2018 | 0.250 | Mar 2019 | - | | 0.250 | Continuing | Continuing | Continuing |
| Program Mgmt/Support | MIPR | ARDEC : Picatinny Arsenal, NJ | 0.822 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603925N / *Directed Energy and Electric Weapon System* | **Project (Number/Name)**<br>9823 / *Lasers for Navy applicat* |

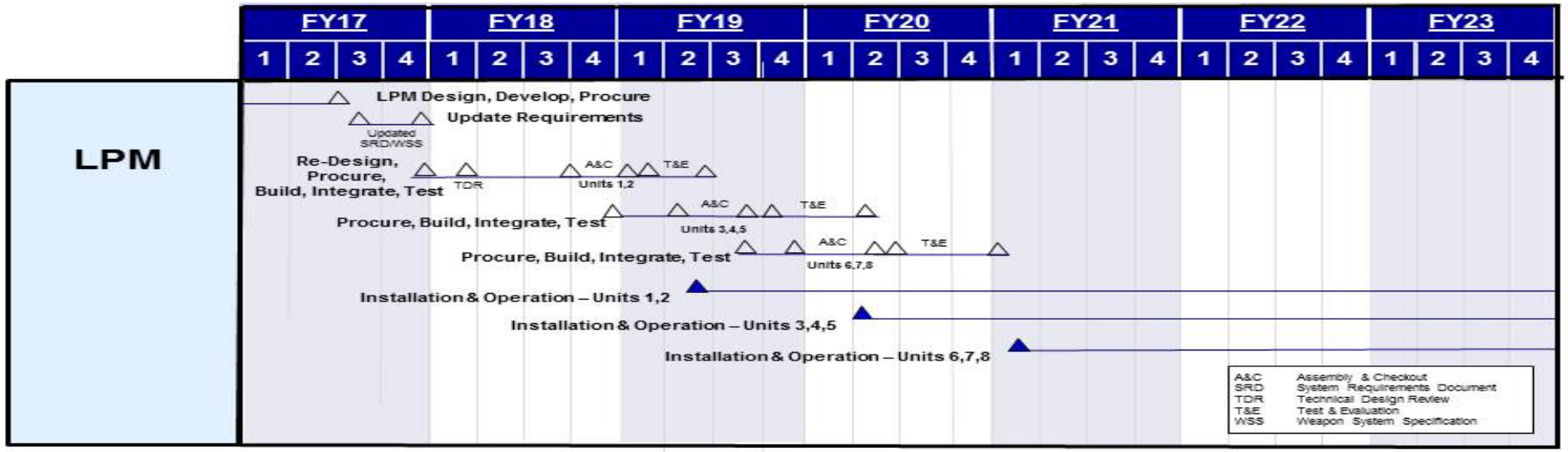
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Safety, Product Support, Security, Operations | WR | NAVFACENG : San Diego, CA | 0.030 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Travel | Various | NAVSEA : Washington, D.C. | 0.052 | 0.022 | Aug 2017 | 0.052 | Feb 2018 | 0.052 | Feb 2019 | - | | 0.052 | Continuing | Continuing | Continuing |
| Program Mgmt/Support | SS/CPFF | SPA Bridge : Washington, D.C. | 0.347 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Program Mgmt/Support | C/CPIF | SPA : Washington, D.C. | 0.000 | 0.355 | Jul 2017 | 0.211 | Feb 2018 | 0.180 | Dec 2018 | - | | 0.180 | Continuing | Continuing | Continuing |
| Program Mgmt/Support | C/CPFF | TMB : Washington, D.C. | 0.000 | 0.150 | Aug 2017 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 1.429 | 0.847 | | 0.513 | | 0.482 | | - | | 0.482 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 22.526 | 12.302 | | 44.029 | | 33.107 | | - | | 33.107 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603925N / *Directed Energy and Electric Weapon System* | **Project (Number/Name)**<br>9823 / *Lasers for Navy applicat* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0603925N / *Directed Energy and Electric Weapon System* | **Project (Number/Name)**<br>9823 / *Lasers for Navy applicat* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 9823*** | | | | |
| Engineering | 1 | 2017 | 4 | 2020 |
| Design/Develop Operational System | 1 | 2017 | 4 | 2020 |
| Initial Component Procurement | 1 | 2017 | 3 | 2017 |
| Update Requirements Design | 3 | 2017 | 4 | 2017 |
| Technical Design Review (TDR) | 1 | 2018 | 1 | 2018 |
| Component Procurement Units 1 and 2 | 1 | 2018 | 4 | 2018 |
| Assembly & Checkout Units 1 and 2 | 4 | 2018 | 1 | 2019 |
| Component Procurement Units 3, 4 and 5 | 4 | 2018 | 2 | 2019 |
| Integration Units 1 and 2 | 1 | 2019 | 1 | 2019 |
| Test and Evaluation Units 1 and 2 | 1 | 2019 | 3 | 2019 |
| Installation and Operation Units 1 and 2 | 2 | 2019 | 4 | 2023 |
| Assembly & Checkout Unit's 3, 4 and 5 | 2 | 2019 | 3 | 2019 |
| Integration Units 3, 4 and 5 | 3 | 2019 | 3 | 2019 |
| Component Procurement Units 6, 7 and 8 | 3 | 2019 | 4 | 2019 |
| Test & Evaluation Unit's 3, 4 and 5 | 4 | 2019 | 2 | 2020 |
| Assembly & Checkout Unit's 6, 7 and 8 | 4 | 2019 | 2 | 2020 |
| Integration Units 6, 7 and 8 | 2 | 2020 | 2 | 2020 |
| Installation and Operation Units 3, 4 and 5 | 2 | 2020 | 4 | 2023 |
| Test and Evaluation Units 6, 7 and 8 | 3 | 2020 | 1 | 2021 |
| Installation and Operation Units 6, 7 and 8 | 1 | 2021 | 4 | 2023 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0604014N *I F/A-18 Infrared Search and Track (IRST)* |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Program Element | 0.000 | 0.000 | 0.000 | 108.700 | - | 108.700 | 120.927 | 56.026 | 5.423 | 5.553 | Continuing | Continuing |
| 2069: *F/A-18 Infrared Search and Track (IRST)* | 0.000 | 0.000 | 0.000 | 108.700 | - | 108.700 | 120.927 | 56.026 | 5.423 | 5.553 | Continuing | Continuing |

**Program MDAP/MAIS Code:**
**Project MDAP/MAIS Code(s):** P510

## A. Mission Description and Budget Item Justification

F/A-18 Infra-Red Search and Track (IRST): The F/A-18 E/F IRST system is a passive long-wave Infra-Red (IR) sensor which provides an alternate fire control system in a high Electronic Attack / Radio Detection and Ranging (RADAR) denied environment. The IRST Block II Engineering Change Proposal (ECP) upgrades two Weapons Replaceable Assemblies (WRAs); the Infra-Red Receiver (IRR) and processor in order to provide full Capabilities Development Document (CDD) capability and enhanced warfighting capability through an improved engagement timeline, improved situational awareness, longer range passive detection and tracking and a larger field of regard with specification performance.

IRST was previously completed under Program Element 0204136N F/A-18 Squadrons and has been transferred to Program Element 0604014N F/A-18 Infrared Search and Track (IRST).

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 0.000 | 0.000 | 0.000 | - | 0.000 |
| Current President's Budget | 0.000 | 0.000 | 108.700 | - | 108.700 |
| Total Adjustments | 0.000 | 0.000 | 108.700 | - | 108.700 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | - | - | | | |
| • Program Adjustments | 0.000 | 0.000 | 108.700 | - | 108.700 |

**Change Summary Explanation**

Technical: Not applicable.
Schedule: Not applicable.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0604014N *I F/A-18 Infrared Search and Track (IRST)* |

The FY 2019 funding request was reduced by $21.973 million to account for the availability of prior year execution balances.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604014N / *F/A-18 Infrared Search and Track (IRST)* | Project (Number/Name)<br>2069 / *F/A-18 Infrared Search and Track (IRST)* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2069: *F/A-18 Infrared Search and Track (IRST)* | 0.000 | 0.000 | 0.000 | 108.700 | - | 108.700 | 120.927 | 56.026 | 5.423 | 5.553 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Project MDAP/MAIS Code:** P510

**A. Mission Description and Budget Item Justification**

F/A-18 Infra-Red Search and Track (IRST): The F/A-18 E/F IRST system is a passive long-wave Infra-Red (IR) sensor which provides an alternate fire control system in a high Electronic Attack / Radio Detection and Ranging (RADAR) denied environment. The IRST Block II Engineering Change Proposal (ECP) upgrades two Weapons Replaceable Assemblies (WRAs); the Infra-Red Receiver (IRR) and processor in order to provide full Capabilities Development Document (CDD) capability and enhanced warfighting capability through an improved engagement timeline, improved situational awareness, longer range passive detection and tracking and a larger field of regard with specification performance.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Infra-Red Search and Track (IRST) | 0.000 | 0.000 | 108.700 | 0.000 | 108.700 |
| ***Articles:*** | - | - | - | - | - |

***Description:*** Technology development and engineering and manufacturing development of an IRST sensor for the F/A-18 E/F. Block I supported technology development and engineering and manufacturing development of an IRST sensor for the F/A-18E/F to provide an alternate fire control system in a high Electronic Attack / Radio Detection and Ranging (RADAR) denied environment. Block I systems currently in production will be utilized as test assets for continued integration, tactics development and aircrew familiarization; will be upgraded via retrofit to a Block II configuration prior to fleet delivery. Block II IRST upgrades the Infra-Red Receiver (IRR) and processor to provide full Capabilities Development Document (CDD) capability and enhanced warfighting capability through an improved engagement timeline, improved situational awareness, longer range passive detection and tracking and a larger field of regard with specification performance.

***FY 2018 Plans:***
N/A

***FY 2019 Base Plans:***
Continue IRST Block II ECP Development Phase 2 (hardware and software). Conduct IRST Block II Technology Readiness Review. Continue IRST Integration Testing (H14 and H16). Continue development of support

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604014N / *F/A-18 Infrared Search and Track (IRST)* | **Project (Number/Name)**<br>2069 / *F/A-18 Infrared Search and Track (IRST)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| equipment. Continue King Air Integration Lab flight testing. Continue Block I/II prototype/EDM conversions and upgrades to full Block II configuration.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>The FY 2019 funding request was increased by $21.707 million over PE 0204136N F/A-18 Squadrons PU 2069 FY18 funding request of $86.993 million. Additional FY19 costs above the continuation of efforts initiated in Program Element 0204136N F/A-18 Squadrons PU 2069 in FY 2018 include procurement of test asset hardware conversion kits to upgrade from the Block II prototype to an EDM configuration as well as additional lab assets to support testing. Increase in developmental lab testing, data analysis and operational test planning. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 0.000 | 108.700 | 0.000 | 108.700 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • APN/05250: *F-18 Series Mod (OSIP 04-14)* | 0.000 | 0.000 | 86.595 | - | 86.595 | 88.435 | 181.810 | 211.698 | 177.619 | 448.004 | 1,194.161 |

**Remarks**

**D. Acquisition Strategy**

Infra-Red Search and Track (IRST). The IRST system is an evolutionary Navy acquisition program with Block I and Block II capabilities. The IRST Block I system developed by the Navy provides a basic capability, supported integration of the sensor onto a fuel tank and into the aircraft and supported aeromechanical flight test required for clearance and carrier qualification of the system. IRST Block I is in the Production and Deployment phase following a successful MS-C decision in December 2014 and will support continued integration with the F/A-18E/F Advanced Mission Computer software through flight testing with System Configuration Sets H14 and H16.

IRST Block II is an ECP to upgrade two WRAs that will provide full CDD capability. Early risk reduction activities were initiated in FY2016, the program executed a pre-development In Progress Review (IPR 1) in October 2017 and has a planned pre-production IPR (IPR 2) scheduled for 4th Quarter FY2018 leading to a planned low rate initial production (APN-5 funded) start in FY2019 to achieve an Initial Operating Capability (IOC) in 4th Quarter FY2021.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604014N / *F/A-18 Infrared Search and Track (IRST)* | **Project (Number/Name)**<br>2069 / *F/A-18 Infrared Search and Track (IRST)* |

**E. Performance Metrics**

IRST Program achieved MS B on 17 June 2011, achieved MS C on 02 December 2014. IRST Block II Pre-Development IPR-1 was conducted 1st Quarter 2018; Pre-Production IPR-2 is scheduled for 4th Quarter FY 2018. IRST Block II systems are scheduled to begin production in FY2019 and IOC in 4th Quarter FY 2021.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604014N / *F/A-18 Infrared Search and Track (IRST)* | Project (Number/Name)<br>2069 / *F/A-18 Infrared Search and Track (IRST)* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Primary Development (Hardware/Software) Infra-Red Search and Track (IRST) | Various | Boeing : St. Louis, MO | 0.000 | 0.000 | | 0.000 | | 49.228 | Dec 2018 | - | | 49.228 | 206.813 | 256.041 | 256.041 |
| Hardware Development | MIPR | USAF (MIT) : Hanscom AFB, MA | 0.000 | 0.000 | | 0.000 | | 1.020 | Nov 2018 | - | | 1.020 | Continuing | Continuing | Continuing |
| Software (S/W) Development | WR | NAWCWD : China Lake, CA | 0.000 | 0.000 | | 0.000 | | 3.348 | Dec 2018 | - | | 3.348 | Continuing | Continuing | Continuing |
| IRST Support Equipment Development | WR | NAWCAD : Lakehurst, NJ | 0.000 | 0.000 | | 0.000 | | 0.050 | Nov 2018 | - | | 0.050 | Continuing | Continuing | Continuing |
| Primary Development | Various | NSMA : Various | 0.000 | 0.000 | | 0.000 | | 42.518 | Nov 2018 | - | | 42.518 | 0.000 | 42.518 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 96.164 | | - | | 96.164 | Continuing | Continuing | N/A |

**Remarks**

NAWCAD Lakehurst, New Jersey, is developing Support Equipment necessary to support the IRST pods. Block II EMD effort ramps up significantly in FY 2019 to support alignment with H16 development and testing in order to achieve IOC in FY 2021.

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Development Support | WR | NAWCWD : China Lake, CA | 0.000 | 0.000 | | 0.000 | | 1.181 | Nov 2018 | - | | 1.181 | Continuing | Continuing | Continuing |
| Development Support | WR | NAWCAD : Patuxent River, MD | 0.000 | 0.000 | | 0.000 | | 3.136 | Nov 2018 | - | | 3.136 | Continuing | Continuing | Continuing |
| Development Support | WR | NSWC : Indian Head, MD | 0.000 | 0.000 | | 0.000 | | 0.060 | Nov 2018 | - | | 0.060 | Continuing | Continuing | Continuing |
| Development Support | WR | NAWCWD : Pt. Mugu, CA | 0.000 | 0.000 | | 0.000 | | 0.022 | Dec 2018 | - | | 0.022 | Continuing | Continuing | Continuing |
| Development Support | WR | FRC Southeast : Jacksonville, FL | 0.000 | 0.000 | | 0.000 | | 0.890 | Nov 2018 | - | | 0.890 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604014N / *F/A-18 Infrared Search and Track (IRST)* | Project (Number/Name)<br>2069 / *F/A-18 Infrared Search and Track (IRST)* | |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Development Support | C/CPFF | NRL : Washington, DC | 0.000 | 0.000 | | 0.000 | | 0.350 | Dec 2018 | - | | 0.350 | 0.000 | 0.350 | 0.350 |
| Development Support | WR | NAVSUP : Mechanicsburg, PA | 0.000 | 0.000 | | 0.000 | | 0.042 | Jan 2019 | - | | 0.042 | 0.000 | 0.042 | - |
| Obsolescence Redesign | Various | Various : Various | 0.000 | 0.000 | | 0.000 | | 0.255 | Dec 2018 | - | | 0.255 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 5.936 | | - | | 5.936 | Continuing | Continuing | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Developmental Test & Evaluation (DT&E) | WR | NAWCAD : Patuxent River, MD | 0.000 | 0.000 | | 0.000 | | 1.696 | Nov 2018 | - | | 1.696 | Continuing | Continuing | Continuing |
| Developmental Test & Evaluation (DT&E) | WR | NAWCWD : China Lake, CA | 0.000 | 0.000 | | 0.000 | | 2.183 | Nov 2018 | - | | 2.183 | Continuing | Continuing | Continuing |
| Operational Test & Evaluation (OT&E) | WR | OPTEVFOR : VX-9 | 0.000 | 0.000 | | 0.000 | | 1.500 | Dec 2018 | - | | 1.500 | Continuing | Continuing | Continuing |
| Operational Test & Evaluation (OT&E) - CSS | Various | OPTEVFOR : VX-9 | 0.000 | 0.000 | | 0.000 | | 0.120 | Jul 2019 | - | | 0.120 | Continuing | Continuing | Continuing |
| Operational Test & Evaluation (OT&E) - CSS | Various | OPTEVFOR : Norfolk, VA | 0.000 | 0.000 | | 0.000 | | 0.100 | Mar 2019 | - | | 0.100 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 5.599 | | - | | 5.599 | Continuing | Continuing | N/A |

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Travel | Various | NAVAIR : Patuxent River, MD | 0.000 | 0.000 | | 0.000 | | 0.020 | Oct 2018 | - | | 0.020 | Continuing | Continuing | Continuing |
| Program Management Support - MISC | Various | NAWCAD : Patuxent River, MD | 0.000 | 0.000 | | 0.000 | | 0.981 | Oct 2018 | - | | 0.981 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604014N / *F/A-18 Infrared Search and Track (IRST)* | **Project (Number/Name)**<br>2069 / *F/A-18 Infrared Search and Track (IRST)* |

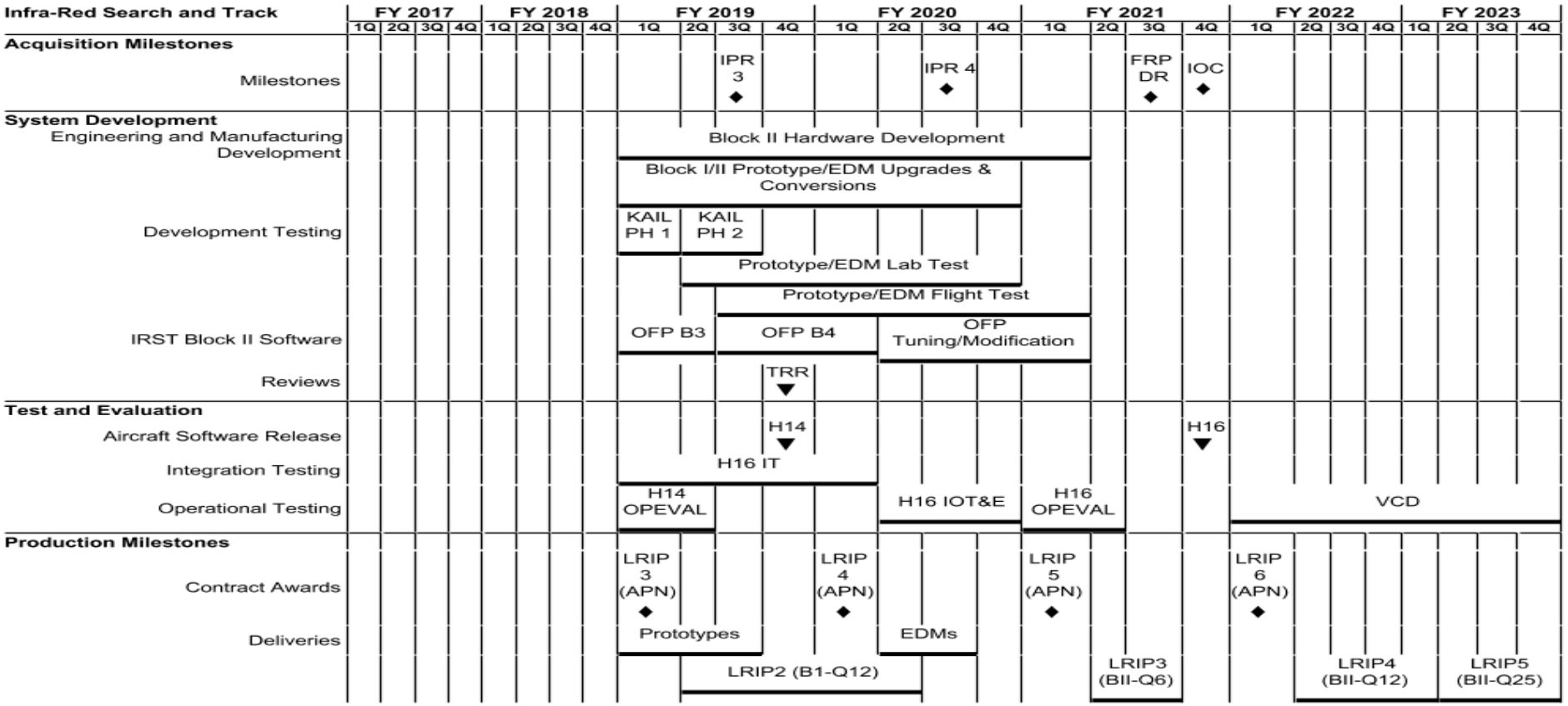
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 1.001 | | - | | 1.001 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 0.000 | | 108.700 | | - | | 108.700 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604014N / *F/A-18 Infrared Search and Track (IRST)* | **Project (Number/Name)**<br>2069 / *F/A-18 Infrared Search and Track (IRST)* |




*2019PB - 0604014N - 2069*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604014N / *F/A-18 Infrared Search and Track (IRST)* | **Project (Number/Name)**<br>2069 / *F/A-18 Infrared Search and Track (IRST)* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Infra-Red Search and Track*** | | | | |
| Acquisition Milestones: Milestones: Full Rate Production Decision Review (FRP DR) | 3 | 2021 | 3 | 2021 |
| Acquisition Milestones: Milestones: Gate 6 / CSB (IPR 3) | 3 | 2019 | 3 | 2019 |
| Acquisition Milestones: Milestones: Gate 6 / CSB (IPR 4) | 3 | 2020 | 3 | 2020 |
| Acquisition Milestones: Milestones: Initial Operating Capability (IOC) | 4 | 2021 | 4 | 2021 |
| System Development: Engineering and Manufacturing Development: Block II ECP Hardware Development | 1 | 2019 | 1 | 2021 |
| System Development: Engineering and Manufacturing Development: Sensor Hardware Conversion and Upgrades (Block I/II Prototype & EDM) | 1 | 2019 | 4 | 2020 |
| System Development: Development Testing: King Air Integration Lab Block II Phase I | 1 | 2019 | 1 | 2019 |
| System Development: Development Testing: King Air Integration Lab Block II Phase II | 2 | 2019 | 3 | 2019 |
| System Development: Development Testing: Block II Test Asset Lab Testing | 2 | 2019 | 4 | 2020 |
| System Development: Development Testing: Block II Test Asset Flight Test | 3 | 2019 | 1 | 2021 |
| System Development: IRST Block II Software: IRST OFP SW B3 | 1 | 2019 | 2 | 2019 |
| System Development: IRST Block II Software: IRST OFP SW B4 | 3 | 2019 | 1 | 2020 |
| System Development: IRST Block II Software: IRST OFP SW Performance Tuning & Modification | 2 | 2020 | 1 | 2021 |
| System Development: Reviews: Technology Readiness Review (TRR) | 4 | 2019 | 4 | 2019 |
| Test and Evaluation: Aircraft Software Release: SCS H14 Fleet Release | 4 | 2019 | 4 | 2019 |
| Test and Evaluation: Aircraft Software Release: SCS H16 Fleet Release | 4 | 2021 | 4 | 2021 |
| Test and Evaluation: Integration Testing: SCS H16 Integration Testing | 1 | 2019 | 1 | 2020 |
| Test and Evaluation: Operational Testing: SCS H14 Operational Evaluation | 1 | 2019 | 2 | 2019 |
| Test and Evaluation: Operational Testing: Verification of Correction of Deficiencies | 1 | 2022 | 4 | 2023 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604014N / *F/A-18 Infrared Search and Track (IRST)* | **Project (Number/Name)**<br>2069 / *F/A-18 Infrared Search and Track (IRST)* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Test and Evaluation: Operational Testing: SCS H16 Integrated Operational Test & Evaluation (IOT&E) | 2 | 2020 | 4 | 2020 |
| Test and Evaluation: Operational Testing: SCS H16 Operational Evaluation | 1 | 2021 | 2 | 2021 |
| Production Milestones: Contract Awards: Block II LRIP 3 (APN) | 1 | 2019 | 1 | 2019 |
| Production Milestones: Contract Awards: Block II LRIP 4 (APN) | 1 | 2020 | 1 | 2020 |
| Production Milestones: Contract Awards: Block II LRIP 5 (APN) | 1 | 2021 | 1 | 2021 |
| Production Milestones: Contract Awards: Block II LRIP 6 (APN) | 1 | 2022 | 1 | 2022 |
| Production Milestones: Deliveries: Block II Prototype Test Assets (RDTE) | 1 | 2019 | 3 | 2019 |
| Production Milestones: Deliveries: Block II EDM Test Assets (RDTE) | 2 | 2020 | 3 | 2020 |
| Production Milestones: Deliveries: LRIP 2 (Block I Lot 2 - Qty 12) | 2 | 2019 | 2 | 2020 |
| Production Milestones: Deliveries: LRIP 3 (Block II Lot 3 - Qty 6) | 2 | 2021 | 3 | 2021 |
| Production Milestones: Deliveries: LRIP 4 (Block II Lot 4 - Qty 12) | 2 | 2022 | 1 | 2023 |
| Production Milestones: Deliveries: LRIP 5 (Block II Lot 5 - Qty 25) | 2 | 2023 | 4 | 2023 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0604027N *I Digital Warfare* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 0.000 | 0.000 | 0.000 | 26.691 | - | 26.691 | 26.120 | 25.944 | 25.942 | 26.466 | Continuing | Continuing |
| 3425: *Digital Warfare Office (DWO) MBE&DT Development* | 0.000 | 0.000 | 0.000 | 26.691 | - | 26.691 | 26.120 | 25.944 | 25.942 | 26.466 | Continuing | Continuing |

**Note**

Digital Warfare (DW) previously funded in PE 0604231N (Tactical Command System), 0603582N (Combat System Integration), and 0605217N (Common Avionics) in FY18 under DW Proj 3425.

**A. Mission Description and Budget Item Justification**

The Digital Warfare (DW) supports systems of systems requirements modeling and allocation, development of data technical baselines, digital architectures and data models, and provides data science for enterprise and warfare pilots in support of a composeable, modular Navy.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 0.000 | 0.000 | 0.000 | - | 0.000 |
| Current President's Budget | 0.000 | 0.000 | 26.691 | - | 26.691 |
| Total Adjustments | 0.000 | 0.000 | 26.691 | - | 26.691 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | - | - | | | |
| • Program Adjustments | 0.000 | 0.000 | 26.691 | - | 26.691 |

**Change Summary Explanation**

The Increase between FY18 to FY19 is attributed to Model Based Systems Engineering teams creating Data Technical Baselines for programs of record. Additionally, the increase supports the creation of the modeling environment and modeling standards and policies.

Technical: Not applicable.
Schedule: Not applicable.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604027N / *Digital Warfare* | Project (Number/Name)<br>3425 / *Digital Warfare Office (DWO) MBE&DT Development* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3425: *Digital Warfare Office (DWO) MBE&DT Development* | 0.000 | 0.000 | 0.000 | 26.691 | - | 26.691 | 26.120 | 25.944 | 25.942 | 26.466 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

Digital Warfare (DW) previously funded in PE 0604231N (Tactical Command System), 0603582N (Combat System Integration), and 0605217N (Common Avionics) in FY18 under DW Proj 3425.

**A. Mission Description and Budget Item Justification**

The DW technical initiatives directly support the Chief of Naval Operations (CNO) vision of inherent interoperability across the Navy enabling faster deployment of capabilities to the warfighter.

Naval Air Systems Command (NAVAIR), Naval Sea Systems Command (NAVSEA), Space and Naval Warfare Command (SPAWAR), associated Program Executive Offices (PEOs), warfare and system centers and University Affiliated Research Centers (UARCs)/Federally Funded Research and Development Centers (FFRDCs) will support the Model Based Systems Engineering (MBSE), Technical Design, and Requirements branches in the new DW under Office of the Chief of Naval Operations (OPNAV) N2N6. In order to develop capability from the top down, the DW will develop requirements for the System of Systems (SoS) to include all of the associated interoperability requirements. Due to the complexity of this work, the DW will evolve the traditional requirements development methodology to a MBSE environment that will include associated model extensions, reports, views, configuration management, help desk support, and documentation. This work will be completed by a series of teams, each focused on a separate threat domain, and made up of system modelers, fleet representatives, Program of Record (PoR) representatives, architecture, and interoperability experts. The products generated by these teams will include data technical baselines for domain areas with individual profiles for each program of record, coordinated requirements recommendations, and potential areas for Science and Technology (S&T) and experimentation to fill gaps. The DW will include emerging digital technologies including human/machine teaming.

Each Systems Command (SYSCOM) will be involved in creating Data Technical Baseline (DTB) profiles specific for each PoR. DTBs will consist of interfaces, protocols, content, information quality, architectural aspects, and knowledge base frameworks. SYSCOMs will exercise technical authority to assess PoR compliance to DTBs and Key Performance Parameters (KPPs) in support of gate reviews and system engineering technical reviews.

DW funding supports development of requirements modeling and data science experimentation environment, mission area model-based engineering (MBE) teams, development of digital technical baselines, development of digital architectures, and the development of workforce training in model-based systems engineering.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Digital Warfare (DW) Model Based Systems Engineering (MBSE) | 0.000 | 0.000 | 10.342 | 0.000 | 10.342 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604027N / *Digital Warfare* | **Project (Number/Name)**<br>3425 / *Digital Warfare Office (DWO) MBE&DT Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY18 Digital Warfare funding resides under PE 0604231N. | | | | | |
| ***FY 2019 Base Plans:***<br>-Provide SME support for the domain functional decomposition based on prioritized mission areas to include Anti-Submarine Warfare, Surface Warfare, Electronic Warfare and Air Warfare.<br>-Continue to establish and implement required extensions to model requirements trace and reports that will be used in the JCIDS process.<br>-Continue to validate current standards across the SYSCOMs to form the overarching Navy DTB in order to facilitate tailoring of each standard for the PoR DTB.<br>-Continue to validate different SYSCOM architectures and guidance to produce a Navy-wide high level architectural framework.<br>-Continue to develop functional baseline architecture of Navy capabilities that maps back to mission threads.<br>-Tune configuration of, and cyber monitor, the distributed Model Based Systems Engineering (MBSE) and data science prototype environment for remote accessibility over a given network enclave, including but not limited to Non-Secure Internet Protocol Router (NIPR), Secure Internet Protocol Router (SIPR), and JointWorldwide Intelligence Communications System (JWICS). Investigate cloud computing with respect to the modeling environment.<br>-Continue to integrate cyber requirements across all Digital Warfare (DW) architecture and standard efforts and verify cyber requirements are captured as part of the modeling process.<br>-Continue to provide subject matter expert support for data science teams in the exploration of data analysis, information and knowledge extraction techniques and application to mission area requirements.<br>-Continue to participate in the definition of MBSE tool functionality and views based on Echelon I stakeholder requirements. Collaboratively develop tool extensions to complement Joint Capabilities Integration and Development System (JCIDS) and Program Objective Memorandum (POM) processes.<br>-Curate models in the modeling environment and support development across Systems Commands (SYSCOMs) in Modeling Standards and Policies for Science and Technology (S&T) and Programs of Record (PoRs).<br>-Develop an overarching Data Technical Baseline (DTB) and DTB profiles for PoRs under SYSCOM cognizance. Assess PoRs against their DTB profile during all Systems Engineering Technical Review events and gate reviews. | | | | | |
| ***FY 2019 OCO Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604027N / *Digital Warfare* | **Project (Number/Name)**<br>3425 / *Digital Warfare Office (DWO) MBE&DT Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>The $4,392K increase between FY18 to FY19 is attributed to Model Based Systems Engineering teams creating Data Technical Baselines for programs of record. Additionally, the increase supports the creation of the modeling environment and modeling standards and policies. | | | | | |
| ***Title:*** DIGITAL WARFARE | 0.000 | 0.000 | 8.539 | 0.000 | 8.539 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY18 Digital Warfare funding resides under PE 0605217N. | | | | | |
| ***FY 2019 Base Plans:***<br>Provide Subject Matter Expert support for the domain functional decomposition based on prioritized mission areas to include Anti-Submarine Warfare, Surface Warfare, Electronic Warfare and Air Warfare. Support the analytical agenda from OPNAV N81 and N9I for the specific mission area capabilities. Provide modeling and documentation support for Joint Capability Integration Development System (JCIDS), OPNAV Program Objective Memorandum (POM) process, and ASN Acquisition Process. Coordinate and work across the SYSCOMs and PEOs on the OPNAV Model Based Systems Engineering (MBSE) requirements allocation process. Develop an overarching Data Technical Baseline and profile for Program of Records (POR) under SYSCOM cognizance. Assess PORs against their profile during all Systems Engineering Technical Review events and gate reviews.<br><br>Participate in the definition of MBSE tool functionality and views based on Echelon I stakeholder requirements. Collaboratively develop tool extensions to complement JCIDS and POM processes. Support development of cross-SYSCOM Modeling Standards and Policies for Science and Technology and Program of Records.<br><br>Provide Subject Matter Expert support for data science teams in data exploration and analysis, information and knowledge extraction techniques, and application to mission area data requirements in support of enterprise productivity and warfighting pilots. Explore Machine Learning techniques to support human/machine teaming for decision making. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604027N / *Digital Warfare* | **Project (Number/Name)**<br>3425 / *Digital Warfare Office (DWO) MBE&DT Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Provide common infrastructure for Model Based System Engineering and Data Technical Baseline environments, to include access management, configuration management, and help desk support.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Increases between FY18 to FY19 are for DW Model Based System Engineering (MBSE) and Data Technical Baseline (DTB) ensuring technical baseline standup in FY20. | | | | | |
| ***Title:*** SYSCOM/PEO DW Support | 0.000 | 0.000 | 7.810 | 0.000 | 7.810 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY18 funding for Digital Warfare resides in PE 0603582N.<br><br>***FY 2019 Base Plans:***<br>-Provide Subject Matter Expert (SME) support for the domain functional decomposition based on prioritized mission areas to include Anti-Submarine Warfare, Surface Warfare, Electronic Warfare and Air Warfare.<br>-Continue to establish and implement required extensions to model requirements trace and reports that will be used in the JCIDS process.<br>-Continue to validate current standards across the SYSCOMs to form the overarching Navy DTB in order to facilitate tailoring of each standard for the PoR DTB.<br>-Continue to validate different SYSCOM architectures and guidance to produce a Navy-wide high level architectural framework.<br>-Continue to develop functional baseline architecture of Navy capabilities that maps back to mission threads.<br>-Tune configuration of, and cyber monitor, the distributed MBSE and data science prototype environment for remote accessibility over a given network enclave, including but not limited to NIPR, SIPR, and JWICS. Investigate cloud computing with respect to the modeling environment.<br>-Continue to integrate cyber requirements across all DW architecture and standard efforts and verify cyber requirements are captured as part of the modeling process.<br>-Continue to provide subject matter expert support for data science teams in the exploration of data analysis, information and knowledge extraction techniques and application to mission area requirements.<br>-Continue to participate in the definition of Model Based Systems Engineering (MBSE) tool functionality and views based on Echelon I stakeholder requirements. Collaboratively develop tool extensions to complement | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604027N / *Digital Warfare* | **Project (Number/Name)**<br>3425 / *Digital Warfare Office (DWO) MBE&DT Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Joint Capabilities Integration and Development System (JCIDS) and Program Objective Memorandum (POM) processes.<br>-Curate models in the modeling environment and support development across Systems Commands (SYSCOMs) in Modeling Standards and Policies for Science and Technology (S&T) and Programs of Record (PoRs).<br>-Develop an overarching Data Technical Baseline (DTB) and DTB profiles for PoRs under SYSCOM cognizance. Assess PoRs against their DTB profile during all Systems Engineering Technical Review events and gate reviews.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Funding increase for Digital Warfare (DW) MBSE Data Technical Baseline standup. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 0.000 | 26.691 | 0.000 | 26.691 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

DW is a non-acquisition effort that informs and matures Navy decisions, which in turn impacts acquisition programs.

**E. Performance Metrics**

Digital Warfare (DW) Performance Metrics: Goal: Chief of Naval Operations (CNO) to set requirement, to prioritize resources, and lead efforts on information interoperability and human/machine testing. Metric: Echelon I development of requirements associated with modeling, data science experimentation environment, and digital architectures.

The DW will set requirements, prioritize resources, and lead efforts on information interoperability and human/machine teaming. This will result in a workforce that is trained in new systems engineering and modeling concepts and tools. It will also result in development of a requirements modeling environment to include associated model extensions, reports, views, and configuration management and in the development of digital technical baselines for programs to use to ensure cross-domain interoperability.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604027N / *Digital Warfare* | **Project (Number/Name)**<br>3425 / *Digital Warfare Office (DWO) MBE&DT Development* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Digital Warfare (DW) | WR | SSC PAC : San Diego, CA | 0.000 | 0.000 | | 0.000 | | 1.052 | Dec 2018 | - | | 1.052 | Continuing | Continuing | Continuing |
| Digital Warfare (DW) | WR | SSC LANT : Charleston, SC | 0.000 | 0.000 | | 0.000 | | 1.228 | Dec 2018 | - | | 1.228 | Continuing | Continuing | Continuing |
| Digital Warfare (DW) | FFRDC | MITRE : McLean, VA | 0.000 | 0.000 | | 0.000 | | 0.615 | Nov 2018 | - | | 0.615 | Continuing | Continuing | Continuing |
| Digital Warfare (DW) | C/CPFF | VENCORE : Chantilly, VA | 0.000 | 0.000 | | 0.000 | | 4.026 | Dec 2018 | - | | 4.026 | Continuing | Continuing | Continuing |
| Digital Warfare (DW) | C/CPFF | SAIC : McLean, VA | 0.000 | 0.000 | | 0.000 | | 3.421 | Jan 2019 | - | | 3.421 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 10.342 | | - | | 10.342 | Continuing | Continuing | N/A |

**Remarks**

The Digital Warfare (DW) previously funded in PE 0604231N (Tactical Command System), 0603582N (Combat System Integration), and 0605217N (Common Avionics) in FY18 under DW Proj 3425.

The $4,392K increase to Product Development between FY18 to FY19 is attributed to Model Based Systems Engineering teams creating Data Technical Baselines for programs of record. Additionally, the increase supports the creation of the modeling environment and modeling standards and policies.

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Digital Warfare Support | WR | Naval Air War : Patuxent River, MD | 0.000 | 0.000 | | 0.000 | | 2.482 | Oct 2018 | - | | 2.482 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 2.482 | | - | | 2.482 | Continuing | Continuing | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DW | WR | NSWCs : Various | 0.000 | 0.000 | | 0.000 | | 3.455 | Dec 2018 | - | | 3.455 | Continuing | Continuing | Continuing |
| DW | WR | NUWC : Various | 0.000 | 0.000 | | 0.000 | | 2.355 | Dec 2018 | - | | 2.355 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604027N / *Digital Warfare* | **Project (Number/Name)**<br>3425 / *Digital Warfare Office (DWO) MBE&DT Development* |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DW | C/CPFF | Various : Various | 0.000 | 0.000 | | 0.000 | | 2.000 | Dec 2018 | - | | 2.000 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 7.810 | | - | | 7.810 | Continuing | Continuing | N/A |

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Contract Engineer Support | Various | Various : Various | 0.000 | 0.000 | | 0.000 | | 6.057 | Dec 2018 | - | | 6.057 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 6.057 | | - | | 6.057 | Continuing | Continuing | N/A |

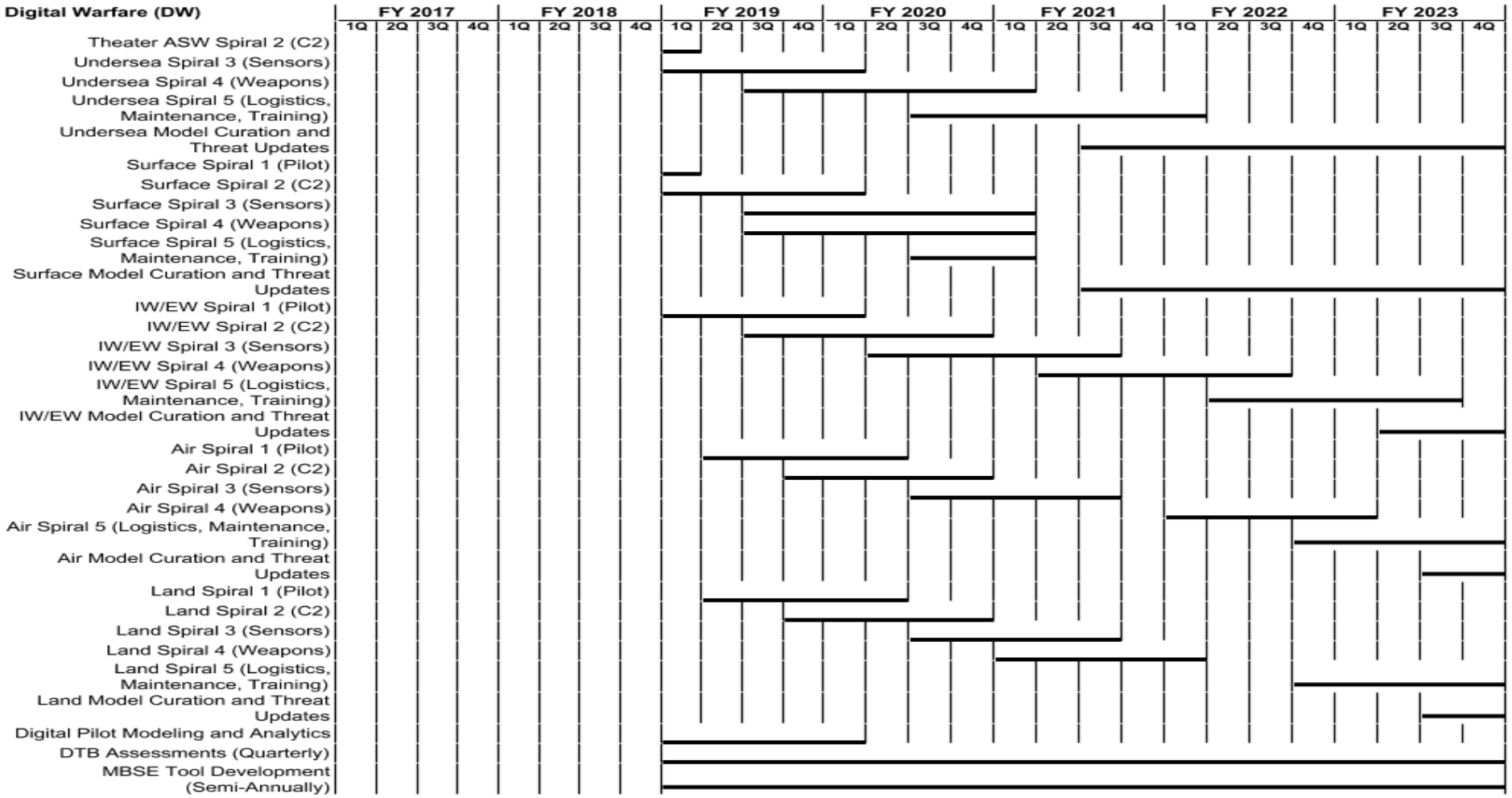
**Remarks**

Funding Increased due to MBSE Data Technical Baseline standup.

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 0.000 | | 26.691 | | - | | 26.691 | Continuing | Continuing | N/A |

**Remarks**

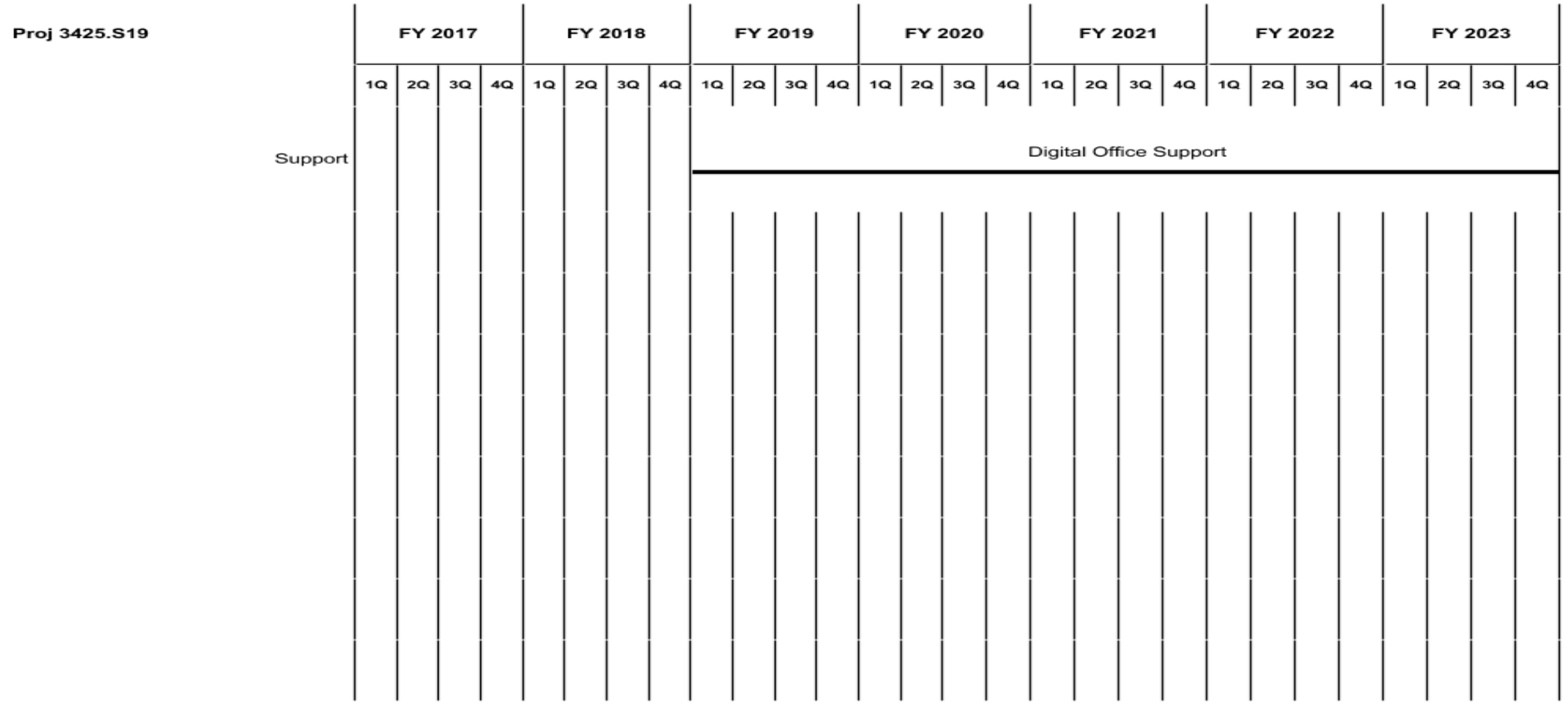
| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604027N / *Digital Warfare* | **Project (Number/Name)**<br>3425 / *Digital Warfare Office (DWO) MBE&DT Development* |



| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604027N / *Digital Warfare* | **Project (Number/Name)**<br>3425 / *Digital Warfare Office (DWO) MBE&DT Development* |

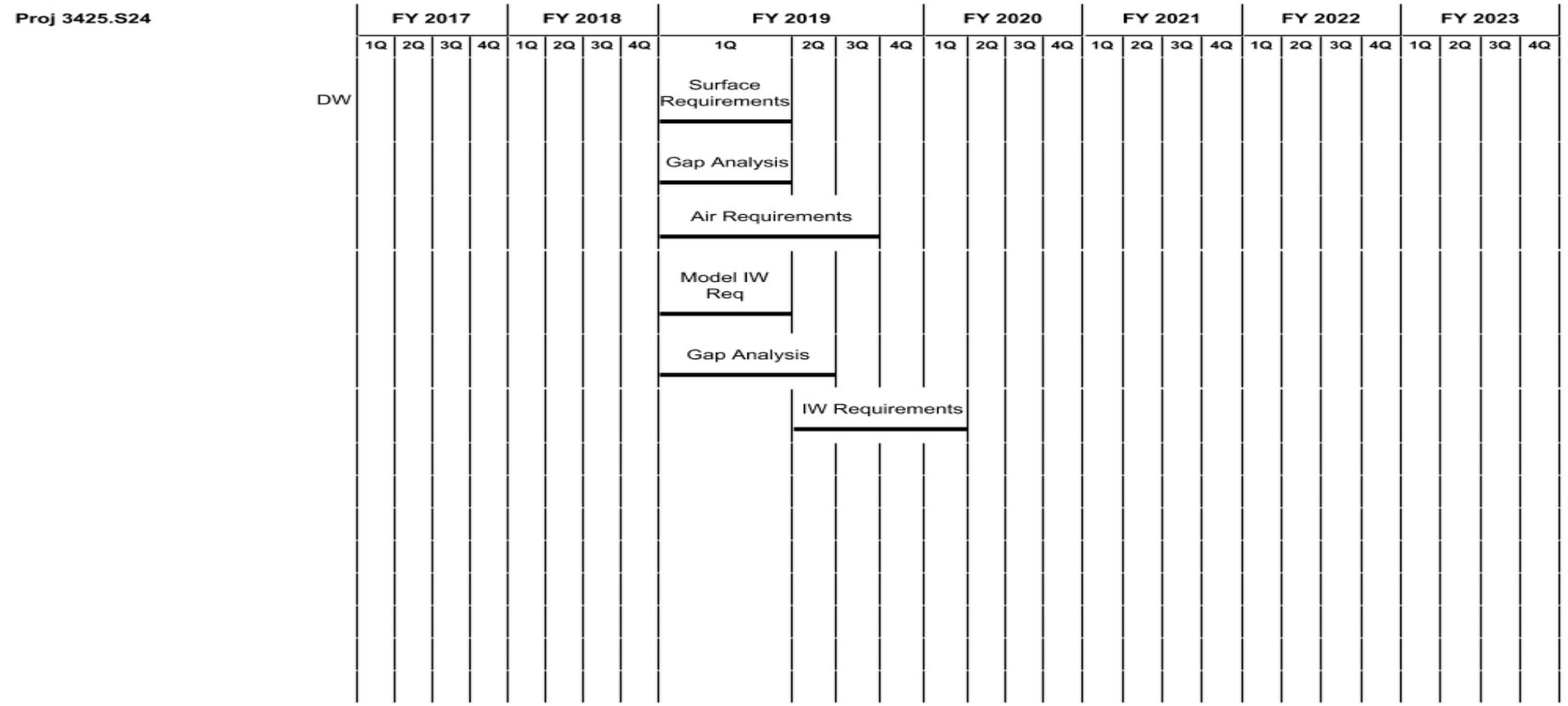
2019PB - 0604027N - 3425.L39

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604027N / *Digital Warfare* | **Project (Number/Name)**<br>3425 / *Digital Warfare Office (DWO) MBE&DT Development* |




*2019PB - 0604027N - 3425.S19*

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604027N / *Digital Warfare* | **Project (Number/Name)**<br>3425 / *Digital Warfare Office (DWO) MBE&DT Development* |




*2019PB - 0604027N - 3425.S24*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604027N / *Digital Warfare* | **Project (Number/Name)**<br>3425 / *Digital Warfare Office (DWO) MBE&DT Development* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Digital Warfare (DW)*** | | | | |
| Theater ASW Spiral 2 (C2): Theater ASW Spiral 2 (C2) | 1 | 2019 | 1 | 2019 |
| Undersea Spiral 3 (Sensors): Undersea Spiral 3 (Sensors) | 1 | 2019 | 1 | 2020 |
| Undersea Spiral 4 (Weapons): Undersea Spiral 4 (Weapons) | 3 | 2019 | 1 | 2021 |
| Undersea Spiral 5 (Logistics, Maintenance, Training): Undersea Spiral 5 (Logistics, Maintenance, Training) | 3 | 2020 | 1 | 2022 |
| Undersea Model Curation and Threat Updates: Undersea Model Curation and Threat Updates | 3 | 2021 | 4 | 2023 |
| Surface Spiral 1 (Pilot): Surface Spiral 1 (Pilot) | 1 | 2019 | 1 | 2019 |
| Surface Spiral 2 (C2): Surface Spiral 2 (C2) | 1 | 2019 | 1 | 2020 |
| Surface Spiral 3 (Sensors): Surface Spiral 3 (Sensors) | 3 | 2019 | 1 | 2021 |
| Surface Spiral 4 (Weapons): Surface Spiral 4 (Weapons) | 3 | 2019 | 1 | 2021 |
| Surface Spiral 5 (Logistics, Maintenance, Training): Surface Spiral 5 (Logistics, Maintenance, Training) | 3 | 2020 | 1 | 2021 |
| Surface Model Curation and Threat Updates: Surface Model Curation and Threat Updates | 3 | 2021 | 4 | 2023 |
| IW/EW Spiral 1 (Pilot): IW/EW Spiral 1 (Pilot) | 1 | 2019 | 1 | 2020 |
| IW/EW Spiral 2 (C2): IW/EW Spiral 2 (C2) | 3 | 2019 | 4 | 2020 |
| IW/EW Spiral 3 (Sensors): IW/EW Spiral 3 (Sensors) | 2 | 2020 | 3 | 2021 |
| IW/EW Spiral 4 (Weapons): IW/EW Spiral 4 (Weapons) | 2 | 2021 | 3 | 2022 |
| IW/EW Spiral 5 (Logistics, Maintenance, Training): IW/EW Spiral 5 (Logistics, Maintenance, Training) | 2 | 2022 | 3 | 2023 |
| IW/EW Model Curation and Threat Updates: IW/EW Model Curation and Threat Updates | 2 | 2023 | 4 | 2023 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604027N / *Digital Warfare* | **Project (Number/Name)**<br>3425 / *Digital Warfare Office (DWO) MBE&DT Development* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Air Spiral 1 (Pilot): Air Spiral 1 (Pilot) | 2 | 2019 | 2 | 2020 |
| Air Spiral 2 (C2): Air Spiral 2 (C2) | 4 | 2019 | 4 | 2020 |
| Air Spiral 3 (Sensors): Air Spiral 3 (Sensors) | 3 | 2020 | 3 | 2021 |
| Air Spiral 4 (Weapons): Air Spiral 4 (Weapons) | 1 | 2022 | 1 | 2023 |
| Air Spiral 5 (Logistics, Maintenance, Training): Air Spiral 5 (Logistics, Maintenance, Training) | 4 | 2022 | 4 | 2023 |
| Air Model Curation and Threat Updates: Air Model Curation and Threat Updates | 3 | 2023 | 4 | 2023 |
| Land Spiral 1 (Pilot): Land Spiral 1 (Pilot) | 2 | 2019 | 2 | 2020 |
| Land Spiral 2 (C2): Land Spiral 2 (C2) | 4 | 2019 | 4 | 2020 |
| Land Spiral 3 (Sensors): Land Spiral 3 (Sensors) | 3 | 2020 | 3 | 2021 |
| Land Spiral 4 (Weapons): Land Spiral 4 (Weapons) | 1 | 2021 | 1 | 2022 |
| Land Spiral 5 (Logistics, Maintenance, Training): Land Spiral 5 (Logistics, Maintenance, Training) | 4 | 2022 | 4 | 2023 |
| Land Model Curation and Threat Updates: Land Model Curation and Threat Updates | 3 | 2023 | 4 | 2023 |
| Digital Pilot Modeling and Analytics: Digital Pilot Modeling and Analytics | 1 | 2019 | 1 | 2020 |
| DTB Assessments (Quarterly): DTB Assessments (Quarterly) | 1 | 2019 | 4 | 2023 |
| MBSE Tool Development (Semi-Annually): MBSE Tool Development (Semi-Annually) | 1 | 2019 | 4 | 2023 |
| Support: DW Support | 1 | 2019 | 4 | 2023 |
| DW: Develop Surface Requirements | 1 | 2019 | 1 | 2019 |
| DW: Air Functional Gap Analysis | 1 | 2019 | 1 | 2019 |
| DW: Develop Air Requirements | 1 | 2019 | 3 | 2019 |
| DW: Model IW Capabilities/Req | 1 | 2019 | 1 | 2019 |
| DW: IW Functional Gap Analysis | 1 | 2019 | 2 | 2019 |
| DW: Develop IW Requirements | 2 | 2019 | 1 | 2020 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0604028N *I Small and Medium Unmanned Undersea Vehicles* |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Program Element | 0.000 | 0.000 | 0.000 | 16.717 | - | 16.717 | 22.747 | 23.598 | 24.031 | 24.031 | Continuing | Continuing |
| 3123: *SMCM UUV* | 0.000 | 0.000 | 0.000 | 16.717 | - | 16.717 | 22.747 | 23.598 | 24.031 | 24.031 | Continuing | Continuing |

**Note**

FY 2018 and prior funding in Program Element (PE) 0603502N. Projects realigned from PE 0603502N starting in FY 2019.

**A. Mission Description and Budget Item Justification**

Part of the mine countermeasure systems mission is to provide minehunting capabilities to counter known and projected mine threats in support of minehunting operations worldwide, including intelligence and oceanographic capabilities that will enable mine warfare superiority. The Knifefish Surface Mine Countermeasure Unmanned Undersea Vehicle (SMCM UUV) is part of the UUV Family of Systems and is part of the MCM Mission Package (MP).

In order to accelerate future capability and support steady growth of the fleet's UUV FoS the Knifefish SMCM UUV program develops advanced Unmanned Undersea Vehicles (UUVs) to support clandestine mine detection capability against volume, bottom, and buried mines. Equipment includes vehicles and associated systems support equipment. In parallel, Pre-Planned Product Improvement (P3I) design efforts are ongoing to support insertion of incremental capability when the technology is ready. Planned P3I candidates being considered include increased detection range capability, communications upgrades, on-board sonar processing and target recognition, command and control improvements, and other smaller tasks, as well as future payloads as required.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 0.000 | 0.000 | 0.000 | - | 0.000 |
| Current President's Budget | 0.000 | 0.000 | 16.717 | - | 16.717 |
| Total Adjustments | 0.000 | 0.000 | 16.717 | - | 16.717 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | - | - | | | |
| • Rate/Misc Adjustments | 0.000 | 0.000 | 16.717 | - | 16.717 |

**Change Summary Explanation**

Program Changes:
FY19 +$16,717K transfer to new Program Element from 0603502N.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0604028N *I Small and Medium Unmanned Undersea Vehicles* |

Technical: Not applicable.
Schedule: Not applicable.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604028N / *Small and Medium Unmanned Undersea Vehicles* | Project (Number/Name)<br>3123 / *SMCM UUV* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3123: *SMCM UUV* | 0.000 | 0.000 | 0.000 | 16.717 | - | 16.717 | 22.747 | 23.598 | 24.031 | 24.031 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

FY 2018 and prior funding in Program Element (PE) 0603502N. Projects realigned from PE 0603502N starting in FY 2019.

**A. Mission Description and Budget Item Justification**

As part of the UUV FOS and in support of the MCM MP, the Knifefish Surface Mine Countermeasure Unmanned Undersea Vehicle (SMCM UUV) program develops advanced Unmanned Undersea Vehicles (UUVs) to support clandestine mine detection capability against volume, bottom, and buried mines. Equipment includes vehicles and associated systems support equipment. In parallel, Pre-Planned Product Improvement (P3I) design efforts are ongoing to support insertion of incremental capability when the technology is ready. Planned P3I candidates being considered include increased detection range capability, communications upgrades, on-board sonar processing and target recognition, command and control improvements, and other smaller tasks, as well as potential future payloads as required.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Knifefish Development | 0.000 | 0.000 | 8.600 | 0.000 | 8.600 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY 2018 funding in Program Element (PE) 0603502N. | | | | | |
| ***FY 2019 Base Plans:***<br>Complete P3I Block 1 development. Commence P3I effort for Block 2 systems (onboard processing and re-acquisition/ID). Conduct developmental efforts for Support systems (processing container, Launch & Recovery, etc.). Achieve Full Rate Production Decision. Perform engineering efforts related to issuing Request for Proposal (RFP) for Full Rate Production. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2018 funding in Program Element (PE) 0603502N. FY 2019 decrease due to completion of E&MD phase transitioning to P3I efforts. | | | | | |
| ***Title:*** Knifefish Support | 0.000 | 0.000 | 3.472 | 0.000 | 3.472 |
| ***Articles:*** | - | - | - | - | - |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604028N / *Small and Medium Unmanned Undersea Vehicles* | **Project (Number/Name)**<br>3123 / *SMCM UUV* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***FY 2018 Plans:***<br>FY 2018 funding in Program Element (PE) 0603502N.<br>***FY 2019 Base Plans:***<br>Provide engineering support for existing EDM systems. Support procurement of LRIP systems as well as issuing RFP for Full Rate Production.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2018 funding in Program Element (PE) 0603502N. FY 2019 decrease due to completion of E&MD phase transitioning to P3I efforts. | | | | | |
| ***Title:*** Knifefish Test and Evaluation | 0.000 | 0.000 | 3.410 | 0.000 | 3.410 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY 2018 funding in Program Element (PE) 0603502N.<br>***FY 2019 Base Plans:***<br>Conduct Knifefish system developmental testing related to P3I efforts, Operational Testing from LCS, and other testing<br>from Vessels of Opportunity (VOO), as required.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2018 funding in Program Element (PE) 0603502N. FY 2019 increase to conduct full Operational Test (OT) from LCS. | | | | | |
| ***Title:*** Knifefish Management | 0.000 | 0.000 | 1.235 | 0.000 | 1.235 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY 2018 funding in Program Element (PE) 0603502N.<br>***FY 2019 Base Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604028N / *Small and Medium Unmanned Undersea Vehicles* | **Project (Number/Name)**<br>3123 / *SMCM UUV* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Conduct acquisition and management of development, procurement, and program activities including Full Rate Production Decision and issuing RFP for Full Rate Production.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2018 funding in Program Element (PE) 0603502N. FY 2019 minor increase due to preparing to transition to Full Rate Production (FRP). | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 0.000 | 16.717 | 0.000 | 16.717 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • OPN/2622: *Minesweeping Replacement* | 26.764 | 31.531 | 35.709 | - | 35.709 | 55.949 | 51.338 | 34.007 | 16.753 | Continuing | Continuing |
| • OPN/1601: *LCS MCM Mission Modules* | 29.724 | 55.870 | 124.147 | - | 124.147 | 204.324 | 245.108 | 227.068 | 234.109 | 1,501.531 | 2,771.262 |
| • RDTEN/0603502N/3123: *SMCM UUV* | 20.890 | 25.052 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 181.472 |

**Remarks**

The above OPN funding lines account for several programs, of which the Knifefish program is only a portion.

**D. Acquisition Strategy**

The Knifefish program was initiated in FY11 to develop Surface Mine Countermeasure Unmanned Undersea Vehicles (SMCM UUV) equipped with advanced Low FrequencyBroadband (LFBB) sonar that provides volume, bottom, and buried mine detection capability. Procurement of the SMCM UUV with LFBB will occur after Milestone C.

**E. Performance Metrics**

Successful Milestone C in 3Q FY 2018 and FRP decision in FY 2019.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604028N / *Small and Medium Unmanned Undersea Vehicles* | Project (Number/Name)<br>3123 / *SMCM UUV* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Knifefish Development & Engineering Support | C/CPIF | General Dynamics AIS : McLeansville, NC | 0.000 | 0.000 | | 0.000 | | 2.000 | Dec 2018 | - | | 2.000 | Continuing | Continuing | Continuing |
| Hardware/Software Development - Support Equipment | WR | NSWC, PC : PANAMA CITY, FL | 0.000 | 0.000 | | 0.000 | | 0.500 | Dec 2018 | - | | 0.500 | Continuing | Continuing | Continuing |
| Knifefish P3I Development Contractor | C/CPIF | GDMS : McLeansville, NC | 0.000 | 0.000 | | 0.000 | | 6.100 | Nov 2018 | - | | 6.100 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 8.600 | | - | | 8.600 | Continuing | Continuing | N/A |

**Remarks**

FY 2018 and prior funding in Program Element (PE) 0603502N.

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Engineering Support | WR | NSWC, PC : PANAMA CITY, FL | 0.000 | 0.000 | | 0.000 | | 0.500 | Dec 2018 | - | | 0.500 | Continuing | Continuing | Continuing |
| Engineering Support | WR | NUWC, Newport : NEWPORT, RI | 0.000 | 0.000 | | 0.000 | | 0.250 | Dec 2018 | - | | 0.250 | Continuing | Continuing | Continuing |
| Engineering Support | WR | VARIOUS : VARIOUS | 0.000 | 0.000 | | 0.000 | | 0.500 | Dec 2018 | - | | 0.500 | Continuing | Continuing | Continuing |
| Engineering Support P3I | WR | NSWC, PC : PANAMA CITY, FL | 0.000 | 0.000 | | 0.000 | | 0.480 | Dec 2018 | - | | 0.480 | Continuing | Continuing | Continuing |
| Engineering Support P3I | WR | NUWC, Newport : NEWPORT, RI | 0.000 | 0.000 | | 0.000 | | 0.220 | Dec 2018 | - | | 0.220 | Continuing | Continuing | Continuing |
| Engineering Support P3I | WR | VARIOUS : VARIOUS | 0.000 | 0.000 | | 0.000 | | 1.522 | Nov 2018 | - | | 1.522 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 3.472 | | - | | 3.472 | Continuing | Continuing | N/A |

**Remarks**

FY 2018 and prior funding in Program Element (PE) 0603502N.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604028N / *Small and Medium Unmanned Undersea Vehicles* | **Project (Number/Name)**<br>3123 / *SMCM UUV* |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Government T&E Support | WR | VARIOUS : VARIOUS | 0.000 | 0.000 | | 0.000 | | 2.150 | Dec 2018 | - | | 2.150 | 0.000 | 2.150 | - |
| Test and Evaluation | WR | COMOPTEVFOR : NORFOLK, VA | 0.000 | 0.000 | | 0.000 | | 0.260 | Dec 2018 | - | | 0.260 | 0.000 | 0.260 | - |
| Government T&E Support | WR | NSWC, PC : PANAMA CITY, FL | 0.000 | 0.000 | | 0.000 | | 1.000 | Dec 2018 | - | | 1.000 | 0.000 | 1.000 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 3.410 | | - | | 3.410 | 0.000 | 3.410 | N/A |

**Remarks**

FY 2018 and prior funding in Program Element (PE) 0603502N.

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management Support | C/CPFF | VARIOUS : WASHINGTON, DC | 0.000 | 0.000 | | 0.000 | | 1.100 | Feb 2019 | - | | 1.100 | 0.000 | 1.100 | - |
| Travel | WR | NAVSEA : WNY, DC | 0.000 | 0.000 | | 0.000 | | 0.135 | Dec 2018 | - | | 0.135 | 0.000 | 0.135 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 1.235 | | - | | 1.235 | 0.000 | 1.235 | N/A |

**Remarks**

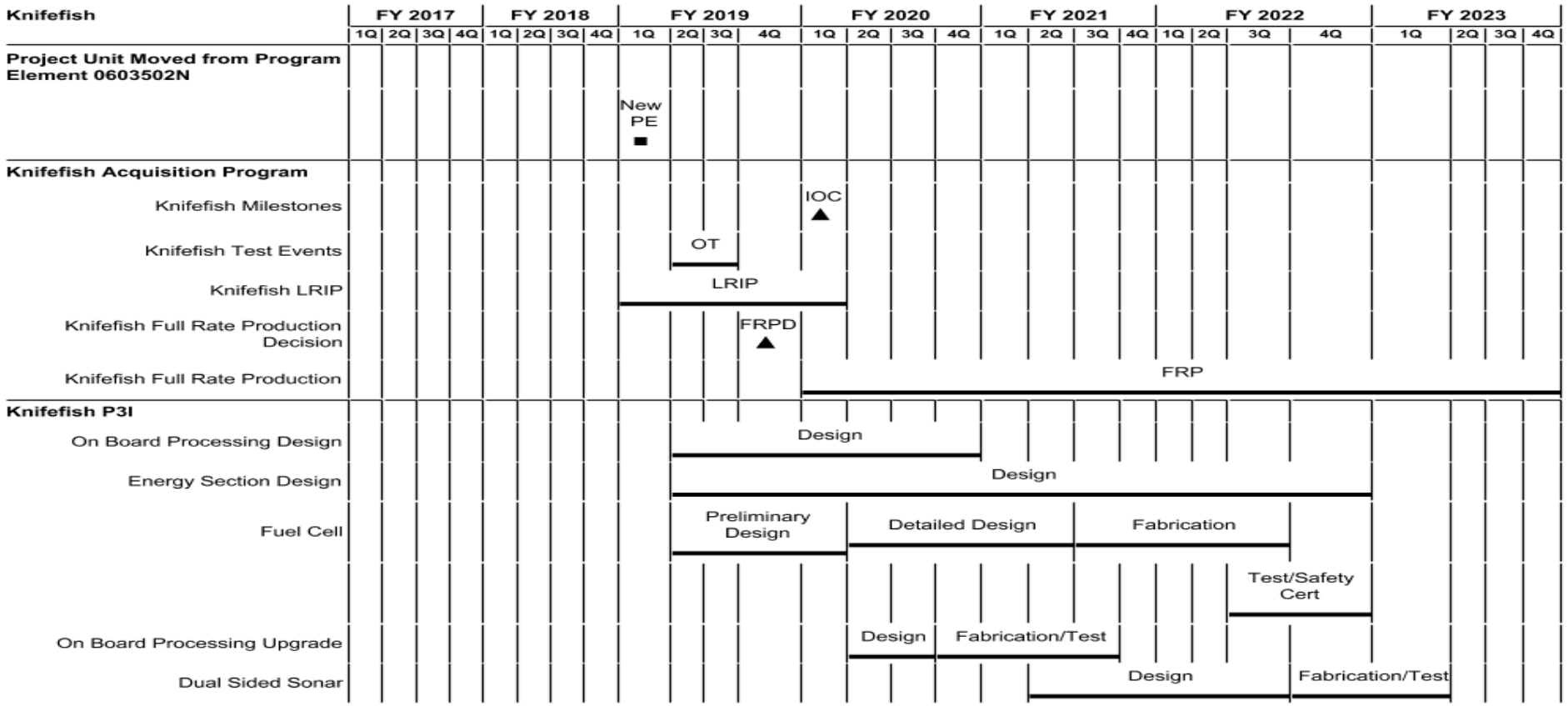
FY 2018 and prior funding in Program Element (PE) 0603502N.

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 0.000 | | 16.717 | | - | | 16.717 | Continuing | Continuing | N/A |

**Remarks**

FY 2018 and prior funding in Program Element (PE) 0603502N.

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604028N / *Small and Medium Unmanned Undersea Vehicles* | **Project (Number/Name)**<br>3123 / *SMCM UUV* |




*2019PB - 0604028N - 3123*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604028N / *Small and Medium Unmanned Undersea Vehicles* | **Project (Number/Name)**<br>3123 / *SMCM UUV* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Knifefish*** | | | | |
| Project Unit Moved from Program Element 0603502N: | 1 | 2019 | 1 | 2019 |
| Knifefish Acquisition Program: Knifefish Milestones: IOC | 1 | 2020 | 1 | 2020 |
| Knifefish Acquisition Program: Knifefish Test Events: OT | 2 | 2019 | 3 | 2019 |
| Knifefish Acquisition Program: Knifefish LRIP: LRIP | 1 | 2019 | 1 | 2020 |
| Knifefish Acquisition Program: Knifefish Full Rate Production Decision: FRPD | 4 | 2019 | 4 | 2019 |
| Knifefish Acquisition Program: Knifefish Full Rate Production: FRP | 1 | 2020 | 4 | 2023 |
| Knifefish P3I: On Board Processing Design: Design | 2 | 2019 | 4 | 2020 |
| Knifefish P3I: Energy Section Design: Design | 2 | 2019 | 4 | 2022 |
| Knifefish P3I: Fuel Cell: Preliminary Design | 2 | 2019 | 1 | 2020 |
| Knifefish P3I: Fuel Cell: Detailed Design | 2 | 2020 | 2 | 2021 |
| Knifefish P3I: Fuel Cell: Fabrication | 3 | 2021 | 3 | 2022 |
| Knifefish P3I: Fuel Cell: Test/Safety Cert | 3 | 2022 | 4 | 2022 |
| Knifefish P3I: On Board Processing Upgrade: Design | 2 | 2020 | 3 | 2020 |
| Knifefish P3I: On Board Processing Upgrade: Fabrication/Test | 4 | 2020 | 3 | 2021 |
| Knifefish P3I: Dual Sided Sonar: Design | 2 | 2021 | 3 | 2022 |
| Knifefish P3I: Dual Sided Sonar: Fabrication/Test | 4 | 2022 | 1 | 2023 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0604029N *I Unmanned Undersea Vehicle Core Technologies* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 0.000 | 0.000 | 0.000 | 30.187 | - | 30.187 | 59.523 | 10.986 | 3.079 | 5.473 | Continuing | Continuing |
| 3393: *Adv Undersea Prototyping-Remote Command & Control* | 0.000 | 0.000 | 0.000 | 12.764 | - | 12.764 | 19.953 | 4.828 | 1.983 | 2.982 | Continuing | Continuing |
| 3395: *Adv Undersea Prototyping-Explosive Payloads* | 0.000 | 0.000 | 0.000 | 8.715 | - | 8.715 | 27.459 | 5.657 | 1.096 | 1.495 | Continuing | Continuing |
| 3396: *Adv Undersea Prototyping-Non-Lethal Payloads* | 0.000 | 0.000 | 0.000 | 8.708 | - | 8.708 | 12.111 | 0.501 | 0.000 | 0.996 | Continuing | Continuing |

**Note**

FY 2018 and prior funding in Program Element (PE) 0604536N. Projects moved from PE 0604536N starting in FY 2019.

The FY 2019 funding request was reduced by $4.835 million to account for the availability of prior year execution balances.

**A. Mission Description and Budget Item Justification**

In order to accelerate future capability and support steady growth of the fleet's Unmanned Undersea Vehicle (UUV) Family of Systems (FoS), UUV core technology efforts include development and test of UUV technologies and will advance the development of unmanned undersea vehicles systems by leveraging ONR and Industry UUV efforts for associated technologies. Payloads will be customized to meet Navy needs and demonstrate useful capability for the fleet. Theis Program Element supports developing experience, demonstrating launch, communications, command and control, navigation, endurance, recovery, payload feasibility, and mission planning and execution initially for XLUUVs and then other UUVs, as applicable. Energy prototyping will leverage existing independent research and development in energy-dense technology that could meet power requirements for future UUV missions that are limited by the amount of power currently available. Efforts include research, development, test, and evaluation of advanced development model energy solutions initially applicable to XLUUVs for increased energy endurance and efficiency to extend the reach of all unmanned undersea systems. The Common Control/Autonomy efforts will include risk reduction and developmental efforts of autonomy systems and architectures to work to develop common standards, interfaces, and systems to support cross-domain applications. The payloads efforts will include investigation, experimentation, demonstration, development and integration of lethal and non-lethal payloads, as applicable.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0604029N *I Unmanned Undersea Vehicle Core Technologies* |

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 0.000 | 0.000 | 0.000 | - | 0.000 |
| Current President's Budget | 0.000 | 0.000 | 30.187 | - | 30.187 |
| Total Adjustments | 0.000 | 0.000 | 30.187 | - | 30.187 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | - | - | | | |
| • Rate/Misc Adjustments | 0.000 | 0.000 | 30.187 | - | 30.187 |

**Change Summary Explanation**

Program Changes:
FY19 +$30,187K transfer to new Program Element from 0604536N.

Technical: Not applicable.
Schedule: Not applicable.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604029N / *Unmanned Undersea Vehicle Core Technologies* | Project (Number/Name)<br>3393 / *Adv Undersea Prototyping-Remote Command & Control* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3393: *Adv Undersea Prototyping-Remote Command & Control* | 0.000 | 0.000 | 0.000 | 12.764 | - | 12.764 | 19.953 | 4.828 | 1.983 | 2.982 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

FY 2018 and prior funding in Program Element (PE) 0604536N.

The FY 2019 funding request was reduced by $1.879 million to account for the availability of prior year execution balances.

**A. Mission Description and Budget Item Justification**

Advanced Undersea energy efforts will leverage existing independent research and development in energy-dense technology that could meet power requirements for the Unmanned Undersea Vehicle (UUV) FoS missions, which are limited by the amount of power that they can carry. Efforts under this program element include research, development, test, and
evaluation of advanced energy solutions initially applicable to XLUUVs for increased energy endurance and efficiency to extend the reach of unmanned undersea systems. The Common Control/Autonomy portion of this project funds risk reduction and developmental efforts of autonomy systems and architectures to work to develop common standards, interfaces, and
systems to support cross-domain applications. This includes advanced development prototyping and demonstrations to accelerate the design and development of commonality and interoperability capabilities for the cross-domain (Surface and Sub-Surface, Aviation and Ground) requirements of the Navy. Coordinating with the Common Control System where
applicable, these efforts will demonstrate scalable, adaptable and interoperable warfighting capabilities across various unmanned systems. The advanced development emphasis will be to encourage innovation and enable rapid integration of UxS capabilities across domains while working to develop common standards, interfaces, and systems. These efforts will define, develop and demonstrate capability that advance new technology, hardware and software of Control Systems that could be used to operate multiple and dissimilar Naval UxSs. Supports Advanced Development and Prototyping of PE 0305205N: UAS Integration and Interoperability.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Product Development | 0.000 | 0.000 | 10.534 | 0.000 | 10.534 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY 2018 funding in Program Element (PE) 0604536N. | | | | | |
| ***FY 2019 Base Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604029N / *Unmanned Undersea Vehicle Core Technologies* | **Project (Number/Name)**<br>3393 / *Adv Undersea Prototyping-Remote Command & Control* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Energy: Continue component design and begin system integration for the Advanced Development Model prototype. Conduct Critical Design Review (CDR). Increase in design and system integration efforts contribute to budget ramp up.<br><br>Autonomy : Commence development of modeling and simulation. Work on standards and specifications initial implementation and modeling/simulation efforts & test bed development. Continue requirements development, focusing on vehicle management. Start initial low-level testing and continue design efforts for CCS.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2018 funding in Program Element (PE) 0604536N. FY 2019 increase in funding is due to increased energy efforts, autonomy modeling and simulation, test bed development, and increased CCS efforts. | | | | | |
| ***Title:*** Support | 0.000 | 0.000 | 1.780 | 0.000 | 1.780 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY 2018 funding in Program Element (PE) 0604536N.<br>***FY 2019 Base Plans:***<br>Energy: Update program documentation as required and support efforts.<br><br>Autonomy: Update documentation and continue work on development of common autonomy standards, interfaces, and systems; support modeling/simulation efforts and test bed development. Update CCS documentation and support testing and design efforts.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2018 funding in Program Element (PE) 0604536N. FY 2019 increase in funding is due to increased support needs for energy, autonomy modeling and simulation, test bed development, and increased CCS efforts. | | | | | |
| ***Title:*** Management | 0.000 | 0.000 | 0.450 | 0.000 | 0.450 |
| ***Articles:*** | - | - | - | - | - |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604029N / *Unmanned Undersea Vehicle Core Technologies* | **Project (Number/Name)**<br>3393 / *Adv Undersea Prototyping-Remote Command & Control* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***FY 2018 Plans:***<br>FY 2018 funding in Program Element (PE) 0604536N.<br>***FY 2019 Base Plans:***<br>Energy: Provide guidance, project planning, financial and contracting support, and coordination between prototype<br>developer, test support, engineering, and contractors.<br><br>Autonomy: Provide guidance, project planning, financial and<br>contracting support, and coordination for development of common autonomy standards, interfaces, and systems, and<br>common control efforts.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2018 funding in Program Element (PE) 0604536N. FY 2019 increase in funding is due to increased management needs for energy, autonomy modeling and simulation, test bed development, and increased CCS efforts. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 0.000 | 12.764 | 0.000 | 12.764 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • RDTEN/0604536N/3393: *Adv Undersea Prototyping-Remote Command & Control* | 1.486 | 2.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 3.486 |

**Remarks**

Funding moved to new Program Element in FY2019

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604029N / *Unmanned Undersea Vehicle Core Technologies* | **Project (Number/Name)**<br>3393 / *Adv Undersea Prototyping-Remote Command & Control* |

**D. Acquisition Strategy**

Design Advanced Energy components to reach Preliminary Design Review in FY18. Develop and build advanced energy prototype and integrate system when ready. Test advanced energy prototype starting in FY21. Develop requirements, standards, interfaces, and architecture for Autonomy and Common Control System (CCS) unmanned system software
components to support common prototyping and experimentation. Design and develop CCS unmanned system software components for common cross domain prototyping and system integration with surrogate systems starting in FY22. Coordination with UxS platforms will eliminate redundant efforts, encourage innovation, and improve coordination of unmanned systems across multiple domains.

Leveraging the available applicable portions of the Common Control System (CCS) capabilities and products, the effort will work to reduce risk with advanced development efforts across Naval operating domains. The advanced energy efforts will leverage resources and prototype expertise to encourage industry innovation and allow for rapid integration into
unmanned systems. Coordinate with other UxS Programs and Systems on the development of UUV autonomy standards, architectures, and systems, defining and focusing autonomy efforts. Develop algorithms and models and simulations for testing autonomy that could be inserted into UUVs.

**E. Performance Metrics**

Demonstrate use of advanced UUV Energy technology in an Advanced Development Model prototype. Demonstrate CCS & autonomy software through surrogate systems.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604029N / *Unmanned Undersea Vehicle Core Technologies* | Project (Number/Name)<br>3393 / *Adv Undersea Prototyping-Remote Command & Control* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Energy Prototype Contract | SS/CPFF | ARL PSU : State College, PA | 0.000 | 0.000 | | 0.000 | | 3.635 | Dec 2018 | - | | 3.635 | Continuing | Continuing | Continuing |
| Common Control System (CCS) Cross-Domain Architecture Development | Various | Various : Various | 0.000 | 0.000 | | 0.000 | | 3.100 | Dec 2018 | - | | 3.100 | Continuing | Continuing | Continuing |
| Autonomy | Various | Various : Various | 0.000 | 0.000 | | 0.000 | | 3.799 | Dec 2018 | - | | 3.799 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 10.534 | | - | | 10.534 | Continuing | Continuing | N/A |

**Remarks**

FY 2018 and prior funding in Program Element (PE) 0604536N.

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Energy Prototype Engineering Support 1 | SS/CPFF | Various : Various | 0.000 | 0.000 | | 0.000 | | 0.794 | Dec 2018 | - | | 0.794 | Continuing | Continuing | Continuing |
| Auontomy Support | Various | NAVSEA Activities : Washington, DC | 0.000 | 0.000 | | 0.000 | | 0.506 | Dec 2018 | - | | 0.506 | Continuing | Continuing | Continuing |
| Common Control System (CCS) Engineering Support | Various | Various : Various | 0.000 | 0.000 | | 0.000 | | 0.480 | Dec 2018 | - | | 0.480 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 1.780 | | - | | 1.780 | Continuing | Continuing | N/A |

**Remarks**

FY 2018 and prior funding in Program Element (PE) 0604536N.

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Energy Prototype | Various | Various : Various | 0.000 | 0.000 | | 0.000 | | 0.150 | Jan 2019 | - | | 0.150 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604029N / *Unmanned Undersea Vehicle Core Technologies* | **Project (Number/Name)**<br>3393 / *Adv Undersea Prototyping-Remote Command & Control* |

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Autonomy | Various | NAVSEA Activities : Washington, DC | 0.000 | 0.000 | | 0.000 | | 0.150 | Jan 2019 | - | | 0.150 | Continuing | Continuing | Continuing |
| Common Control System (CCS) | Various | Various : Various | 0.000 | 0.000 | | 0.000 | | 0.150 | Jan 2019 | - | | 0.150 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 0.450 | | - | | 0.450 | Continuing | Continuing | N/A |

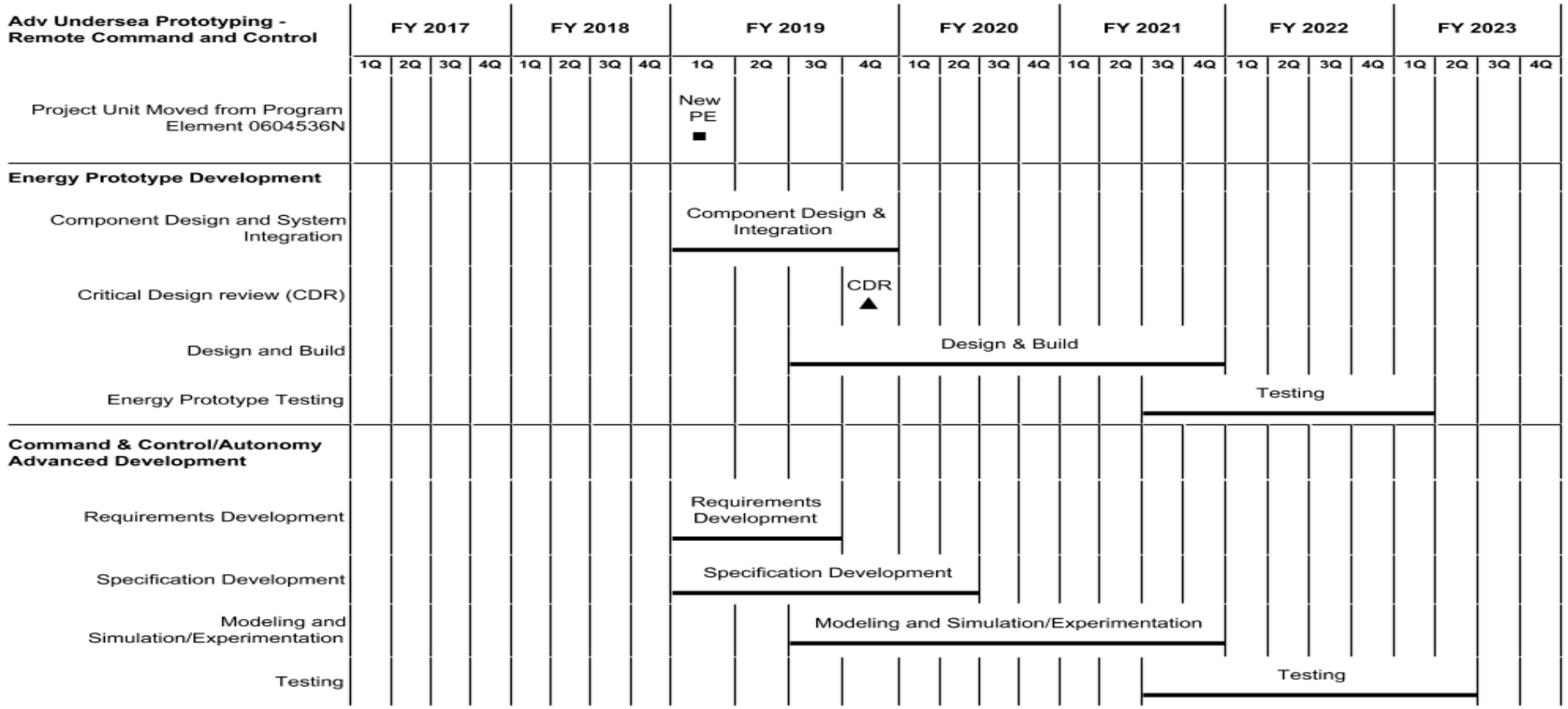
**Remarks**

FY 2018 and prior funding in Program Element (PE) 0604536N.

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 0.000 | | 12.764 | | - | | 12.764 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604029N / *Unmanned Undersea Vehicle Core Technologies* | **Project (Number/Name)**<br>3393 / *Adv Undersea Prototyping-Remote Command & Control* |




*2019PB - 0604029N - 3393*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604029N / *Unmanned Undersea Vehicle Core Technologies* | **Project (Number/Name)**<br>3393 / *Adv Undersea Prototyping-Remote Command & Control* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Adv Undersea Prototyping - Remote Command and Control*** | | | | |
| Project Unit Moved from Program Element 0604536N: New PE | 1 | 2019 | 1 | 2019 |
| Energy Prototype Development: Component Design and System Integration: Component Design and System Integration | 1 | 2019 | 4 | 2019 |
| Energy Prototype Development: Critical Design review (CDR): Critical Design review (CDR) | 4 | 2019 | 4 | 2019 |
| Energy Prototype Development: Design and Build: Design and Build | 3 | 2019 | 4 | 2021 |
| Energy Prototype Development: Energy Prototype Testing: Testing | 3 | 2021 | 1 | 2023 |
| Command & Control/Autonomy Advanced Development: Requirements Development: Requirements Development | 1 | 2019 | 3 | 2019 |
| Command & Control/Autonomy Advanced Development: Specification Development: Specification Development | 1 | 2019 | 2 | 2020 |
| Command & Control/Autonomy Advanced Development: Modeling and Simulation/ Experimentation: | 3 | 2019 | 4 | 2021 |
| Command & Control/Autonomy Advanced Development: Testing: Testing | 3 | 2021 | 2 | 2023 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604029N / *Unmanned Undersea Vehicle Core Technologies* | Project (Number/Name)<br>3395 / *Adv Undersea Prototyping-Explosive Payloads* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3395: *Adv Undersea Prototyping-Explosive Payloads* | 0.000 | 0.000 | 0.000 | 8.715 | - | 8.715 | 27.459 | 5.657 | 1.096 | 1.495 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

FY 2018 and prior funding in Program Element (PE) 0604536N.

The FY 2019 funding request was reduced by $1.253 million to account for the availability of prior year execution balances.

**A. Mission Description and Budget Item Justification**

Advanced undersea prototyping of undersea explosive payloads initially from XL sized UUVs, and eventually from other UUVs in the UUV FOS. Leveraging the developments at ONR and other activities for undersea weapons, work to complete analysis of feasibility, policy, lethality, and performance of integrating undersea weapons systems initially on XLUUVs. The program will design new hardware, investigate and develop new interfaces/systems to increase lethality in both the undersea and surface targets. New C2 algorithms will be developed for advanced targeting. Once initially proven on XLUUVs, efforts will support integrating on applicable FOS UUVs, as applicable.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Explosive Payloads | 0.000 | 0.000 | 8.715 | 0.000 | 8.715 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY 2018 funding in Program Element (PE) 0604536N. | | | | | |
| ***FY 2019 Base Plans:***<br>Continue development of XLUUV Undersea weapons payload systems. Order initial material in support of design. Continue XLUUV interface development. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2018 and prior funding in Program Element (PE) 0604536N. FY 2019 increase in funding supports material order and increased development efforts. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 0.000 | 8.715 | 0.000 | 8.715 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604029N / *Unmanned Undersea Vehicle Core Technologies* | **Project (Number/Name)**<br>3395 / *Adv Undersea Prototyping-Explosive Payloads* |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • RDTEN/0604536N/3395: *Adv Undersea Prototyping-Explosive Payloads* | 1.220 | 2.014 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 3.234 |

**Remarks**

Funding moved to new Program Element in FY2019

**D. Acquisition Strategy**

Leverage the knowledge base at the Naval Research and Development Enterprise to complete the feasibility studies that will then lead to the development of critical technology. The effort will heavily use the experience resident in the undersea weapons industrial base .

**E. Performance Metrics**

Successful launch of undersea weapons from an ORCA XLUUV.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604029N / *Unmanned Undersea Vehicle Core Technologies* | **Project (Number/Name)**<br>3395 / *Adv Undersea Prototyping-Explosive Payloads* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| XL Payload Interface Design & Fabrication | C/CPIF | TBD : TBD | 0.000 | 0.000 | | 0.000 | | 5.035 | Jan 2019 | - | | 5.035 | Continuing | Continuing | Continuing |
| COMMAND AND CONTROL | WR | TBD : TBD | 0.000 | 0.000 | | 0.000 | | 1.609 | Dec 2018 | - | | 1.609 | Continuing | Continuing | Continuing |
| Tech Support | C/CPFF | TBD : TBD | 0.000 | 0.000 | | 0.000 | | 0.991 | Jan 2019 | - | | 0.991 | Continuing | Continuing | Continuing |
| Management | WR | TBD : TBD | 0.000 | 0.000 | | 0.000 | | 0.300 | Nov 2018 | - | | 0.300 | Continuing | Continuing | Continuing |
| Safety | WR | NSWC Indian Head : Indian Head, MD | 0.000 | 0.000 | | 0.000 | | 0.780 | Jan 2019 | - | | 0.780 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 8.715 | | - | | 8.715 | Continuing | Continuing | N/A |

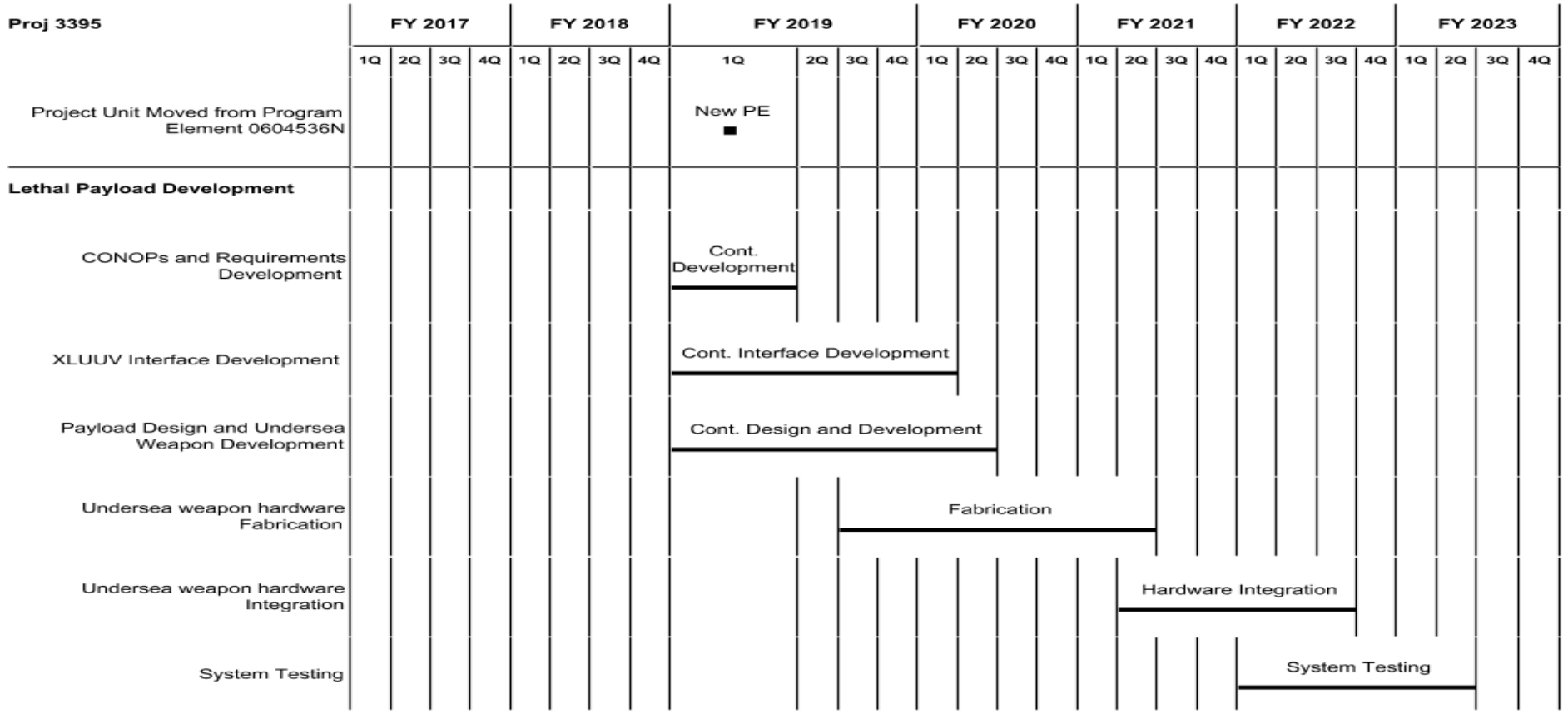
**Remarks**

Project moved to new Program Element in FY2019

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 0.000 | | 8.715 | | - | | 8.715 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604029N / *Unmanned Undersea Vehicle Core Technologies* | **Project (Number/Name)**<br>3395 / *Adv Undersea Prototyping-Explosive Payloads* |




*2019PB - 0604029N - 3395*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604029N / *Unmanned Undersea Vehicle Core Technologies* | **Project (Number/Name)**<br>3395 / *Adv Undersea Prototyping-Explosive Payloads* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3395*** | | | | |
| Project Unit Moved from Program Element 0604536N: New PE | 1 | 2019 | 1 | 2019 |
| Lethal Payload Development: CONOPs and Requirements Development: CONOPs and Requirements | 1 | 2019 | 1 | 2019 |
| Lethal Payload Development: XLUUV Interface Development: Schedule Detail | 1 | 2019 | 1 | 2020 |
| Lethal Payload Development: Payload Design and Undersea Weapon Development: Phase A concept design- XL UUV Interface development | 1 | 2019 | 2 | 2020 |
| Lethal Payload Development: Undersea weapon hardware Fabrication: Fabrication | 3 | 2019 | 2 | 2021 |
| Lethal Payload Development: Undersea weapon hardware Integration: | 2 | 2021 | 3 | 2022 |
| Lethal Payload Development: System Testing: | 1 | 2022 | 2 | 2023 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604029N / *Unmanned Undersea Vehicle Core Technologies* | Project (Number/Name)<br>3396 / *Adv Undersea Prototyping-Non-Lethal Payloads* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3396: *Adv Undersea Prototyping-Non-Lethal Payloads* | 0.000 | 0.000 | 0.000 | 8.708 | - | 8.708 | 12.111 | 0.501 | 0.000 | 0.996 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

FY 2018 and prior funding in Program Element (PE) 0604536N.

The FY 2019 funding request was reduced by $1.253 million to account for the availability of prior year execution balances.

**A. Mission Description and Budget Item Justification**

Advanced undersea prototyping will experiment and demonstrate non-lethal payloads on ORCA XLUUVs for use initially on ORCA XLUUV and then on other FoS UUVs. This effort will investigate the possibilities of employing non-lethal payloads initially from the XLUUV to support ISR and strike missions. Non-kinetic payloads provide the warfare commander
an option to stop aggressive behavior without escalating the conflict. Non-lethal payloads that will be considered include jamming, EO/IR dazzling, microwave, aerial assets, and other methods. Once initially proven on XLUUVs, efforts will support integrating on applicable FOS UUVs, as applicable.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Non Lethal Payloads | 0.000 | 0.000 | 8.708 | 0.000 | 8.708 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY 2018 funding in Program Element (PE) 0604536N. | | | | | |
| ***FY 2019 Base Plans:***<br>Conduct design efforts for the non-lethal payloads of the XLUUVs, develop the Interface Control Document (ICD).<br>Commence planning for the fabrication effort. Order long lead material. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604029N / *Unmanned Undersea Vehicle Core Technologies* | **Project (Number/Name)**<br>3396 / *Adv Undersea Prototyping-Non-Lethal Payloads* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| FY 2018 funding in Program Element (PE) 0604536N. Increase in FY 2019 funding supports long lead time material and increased development efforts. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 0.000 | 8.708 | 0.000 | 8.708 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • RDTEN/0604536N/3396: *Adv Undersea Prototyping-Non-Lethal Payloads* | 0.500 | 1.017 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.517 |

**Remarks**

Funding moved to new Program Element in FY2019

**D. Acquisition Strategy**

A technology study and market research will be completed in the first 12 months to examine the options available and the impact to the warfighter the different technology options bring. This will use a group of experts throughout the advanced undersea industry. Initial design efforts of a prototype system for the development of a non-kinetic payload will start in late FY18 for preliminary efforts with main efforts occurring after the study is completed. The payload will be initially integrated and demonstrated on the ORCA XLUUV.

**E. Performance Metrics**

Non-kinetic payload integrated onto an XLUUV. Detailed metrics are classified.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604029N / *Unmanned Undersea Vehicle Core Technologies* | **Project (Number/Name)**<br>3396 / *Adv Undersea Prototyping-Non-Lethal Payloads* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Design, Material, & Fabrication Efforts | WR | TBD : TBD | 0.000 | 0.000 | | 0.000 | | 6.975 | Nov 2018 | - | | 6.975 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 6.975 | | - | | 6.975 | Continuing | Continuing | N/A |

**Remarks**

Project moved to new Program Element in FY2019

**Support ($ in Millions)**

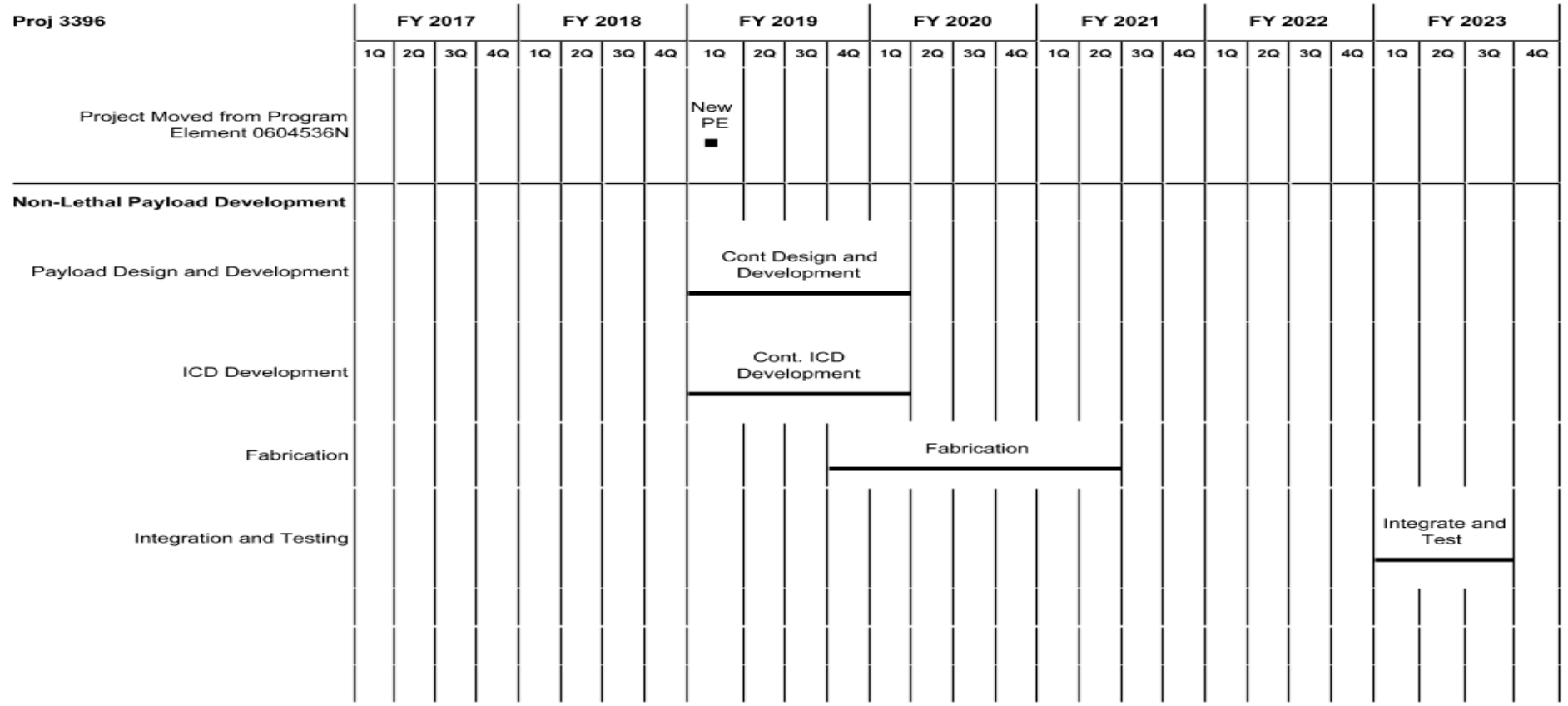
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DESIGN ANALYSIS | WR | NRL : WASHINGTON, D.C. | 0.000 | 0.000 | | 0.000 | | 0.885 | Nov 2018 | - | | 0.885 | Continuing | Continuing | Continuing |
| Program Support | C/FFP | various : Arlington, VA | 0.000 | 0.000 | | 0.000 | | 0.848 | Nov 2018 | - | | 0.848 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 1.733 | | - | | 1.733 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 0.000 | | 8.708 | | - | | 8.708 | Continuing | Continuing | N/A |

**Remarks**

Project moved to new Program Element in FY2019

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604029N / *Unmanned Undersea Vehicle Core Technologies* | **Project (Number/Name)**<br>3396 / *Adv Undersea Prototyping-Non-Lethal Payloads* |




*2019PB - 0604029N - 3396*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604029N / *Unmanned Undersea Vehicle Core Technologies* | **Project (Number/Name)**<br>3396 / *Adv Undersea Prototyping-Non-Lethal Payloads* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3396*** | | | | |
| Project Moved from Program Element 0604536N: Schedule Detail | 1 | 2019 | 1 | 2019 |
| Non-Lethal Payload Development: Payload Design and Development: | 1 | 2019 | 1 | 2020 |
| Non-Lethal Payload Development: ICD Development: | 1 | 2019 | 1 | 2020 |
| Non-Lethal Payload Development: Fabrication: | 4 | 2019 | 2 | 2021 |
| Non-Lethal Payload Development: Integration and Testing: | 1 | 2023 | 3 | 2023 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0604030N *I Rapid Prototyping, Experimentation and Demonstrati* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 0.000 | 0.000 | 0.000 | 48.796 | - | 48.796 | 36.197 | 41.977 | 42.358 | 43.266 | Continuing | Continuing |
| 0385: *Rapid Prototype Development* | 0.000 | 0.000 | 0.000 | 48.796 | - | 48.796 | 36.197 | 41.977 | 42.358 | 43.266 | Continuing | Continuing |

**Note**

Efforts in this Program Element (PE) and Project Unit (PU) 0385 were previously funded in PE 0603382N Advanced Combat Systems Tech; PU 0385 Rapid Prototype Development, and PU 0399 Unmanned Rapid Prototype Development. Funds are transferred to this PU effective FY2019.

**A. Mission Description and Budget Item Justification**

Department of Navy (DON) leadership has acknowledged that maintaining maritime superiority depends in part on our ability to accelerate the speed of warfighting and technological innovations in order to extend our advantage to offset our adversaries' growing capabilities. It is fundamental to the DON's efforts to improve our acquisition outcomes. This program element is aligned with, and in direct response to, calls for increased prototyping and experimentation in USD(AT&L)'s Better Buying Power 3.0, Secretary of the Navy's (SECNAV) Task Force Innovation direction, and the CNO direction to achieve High Velocity Learning at Every Level. These efforts will reinvigorate and increase the use of prototyping to rapidly field new warfighting capabilities, concepts and technologies, and engineering solutions.

The Rapid Prototype Development program funds a strategic focus on rapid prototyping of innovative combat system technologies and engineering innovations to explore Fleet-proposed capability concepts and needs, as well as foster advancements in naval warfighting capabilities. With an emphasis on rapidly prototyping mature technologies, the program is intended to expedite the development, exploration and fielding of technology and engineering prototypes to provide advanced warfighting capabilities, new technologies and engineering innovations across all Naval warfighting domains. Concepts and enabling technologies include but are not limited to; directed energy weapons, hypersonics, unmanned systems, artificial intelligence, machine learning, and multi-domain operations.

Specific projects under this program will be selected and executed in accordance with the Department of the Navy (DoN) Accelerated Acquisition Process as described in SECNAVINST 5000.42. The Secretary of the Navy will notify Congress prior to initiation of a project under this program in accordance with the requirements established in Section 216 of the FY2017 National Defense Authorization Act.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | Date: February 2018 |
|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | R-1 Program Element (Number/Name)<br>PE 0604030N *I Rapid Prototyping, Experimentation and Demonstrati* | | |
| **B. Program Change Summary ($ in Millions)** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** |
| Previous President's Budget | 0.000 | 0.000 | 0.000 | - | 0.000 |
| Current President's Budget | 0.000 | 0.000 | 48.796 | - | 48.796 |
| Total Adjustments | 0.000 | 0.000 | 48.796 | - | 48.796 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | - | - | | | |
| • Rate/Misc Adjustments | 0.000 | 0.000 | 48.796 | - | 48.796 |

**Change Summary Explanation**

Technical: Not applicable.

Schedule: Not applicable.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604030N / *Rapid Prototyping, Experimentation and Demonstrati* | Project (Number/Name)<br>0385 / *Rapid Prototype Development* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0385: *Rapid Prototype Development* | 0.000 | 0.000 | 0.000 | 48.796 | - | 48.796 | 36.197 | 41.977 | 42.358 | 43.266 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

Efforts in this Project Unit (PU) 0385 were previously funded in PE 0603382N Advanced Combat Systems Tech; PU 0385 Rapid Prototype Development and PU 0399 Unmanned Rapid Prototype Development. Funds are transferred to this PU effective FY2019.

**A. Mission Description and Budget Item Justification**

Department of Navy (DON) leadership has acknowledged that maintaining maritime superiority depends in part on our ability to accelerate the speed of warfighting and technological innovations in order to extend our advantage to offset our adversaries' growing capabilities. It is fundamental to the DON's efforts to improve our acquisition outcomes. This project is aligned with, and in direct response to, calls for increased prototyping and experimentation in USD(AT&L)'s Better Buying Power 3.0, Secretary of the Navy's (SECNAV) Task Force Innovation direction, and the CNO direction to achieve High Velocity Learning at Every Level. These efforts will reinvigorate and increase the use of prototyping to rapidly field new warfighting capabilities, concepts and technologies, and engineering solutions.

The Rapid Prototype Development project funds a strategic focus on rapid prototyping of innovative combat system technologies and engineering innovations to explore Fleet-proposed capability concepts and needs, as well as foster advancements in naval warfighting capabilities. With an emphasis on rapidly prototyping mature technologies, the project is intended to expedite the development, exploration and fielding of technology and engineering prototypes to provide advanced warfighting capabilities, new technologies and engineering innovations across all Naval warfighting domains. Concepts and enabling technologies include but are not limited to; directed energy weapons, hypersonics, unmanned systems, artificial intelligence, machine learning, and multi-domain operations.

Specific projects under this project number will be selected and executed in accordance with the Department of the Navy (DoN) Accelerated Acquisition Process as described in SECNAVINST 5000.42. The Secretary of the Navy will notify Congress prior to initiation of a project under this project number in accordance with the requirements established in Section 216 of the FY2017 National Defense Authorization Act.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Rapid Prototype Development, Experimentation and Demonstration | 0.000 | 0.000 | 48.796 | 0.000 | 48.796 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Plans and associated resources in this project support the SURTASS-E Rapid Prototyping, Experimentation and Demonstration (RPED) effort which will provide a modular, flexible, and rapidly deployable mobile acoustic | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604030N / *Rapid Prototyping, Experimentation and Demonstrati* | **Project (Number/Name)**<br>0385 / *Rapid Prototype Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| wide-area surveillance capability for installation aboard a vessel of opportunity (VOO). The project will deliver and demonstrate one system consisting of International Organization for Standardization containerized mission system ship set, installed on a VOO. Specific FY18 activities include: design and development of the SURTASS-E winch and handling system; procurement of long lead sub-systems for the command, control, communications, computers and intelligence (C4I) van; mission system hardware and software development and integration; VOO assessment, leasing and platform evaluation; VOO installation hardware; towed array towing hardware; acoustic processing development; and system level ship integration and performance assessment.<br><br>Additionally, Project 0385 will support other FY2018 RPED initiatives, as designated by the Accelerated Acquisition Board of Directors (AABoD) in accordance with SECNAVINST 5000.42 to expedite the development, exploration and fielding of technology and engineering prototypes to provide advanced warfighting capabilities, new technologies and engineering innovations across all Naval warfighting domains.<br>***FY 2019 Base Plans:***<br>Complete SURTASS-E RDT&E activities to support initial fielding of capability in FY2019.<br><br>Continue to fund RPED projects designated by the AABoD. Potential RPED projects may include, but are not limited to; directed energy weapons, hypersonics, unmanned systems, artificial intelligence, machine learning, and multi-domain operations.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>The increase from FY2018 and FY2019 in this project reflect increased investment in RPED projects designated by the AABoD and planned for execution in FY2019. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 0.000 | 48.796 | 0.000 | 48.796 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604030N / *Rapid Prototyping, Experimentation and Demonstrati* | **Project (Number/Name)**<br>0385 / *Rapid Prototype Development* |

**D. Acquisition Strategy**

Projects identified for execution under this project number are non-acquisition programs. Each project will develop a project plan to support project execution. Project plans will include a project schedule and technical requirements and objectives to measure project performance. The selected technical solutions will be demonstrated in operationally relevant environments to assess their ability to meet warfighter requirements. Project deliverables include actual integrated hardware/software prototype systems, CONOPS, requirements, test reports, technical data, and associated doctrine, organization, training, leadership and education, and personnel aspects necessary to support decision making. These deliverables will be used to support project disposition decisions to include transition of technologies to acquisition, further refinement of the technology, or termination and reinvestment of remaining funds to other technologies that add military value.

**E. Performance Metrics**

Performance metrics are specific to each of the projects funded. All will include measures identified in the Statement of Objectives (SOO), including completions, successes, terminations, and iterative prototype cycle times reported against schedules and deliverables stated in the requirement documents.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604030N / *Rapid Prototyping, Experimentation and Demonstrati* | **Project (Number/Name)**<br>0385 / *Rapid Prototype Development* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Common Support Modules Dev Integration | MIPR | PMS 420 : Washington, DC | 0.000 | 0.000 | | 0.000 | | 0.900 | Dec 2018 | - | | 0.900 | 5.000 | 5.900 | - |
| Towed Army Towing | C/CPFF | Lockheed Martin : Manassas, Va | 0.000 | 0.000 | | 0.000 | | 3.700 | Dec 2018 | - | | 3.700 | 3.700 | 7.400 | - |
| Prototype Dev, Experiemt & Demonstration | Various | Various : Various | 0.000 | 0.000 | | 0.000 | | 44.196 | Mar 2019 | - | | 44.196 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 48.796 | | - | | 48.796 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 0.000 | | 48.796 | | - | | 48.796 | Continuing | Continuing | N/A |

**Remarks**

Support and Test and Evaluation costs are directly associated with the delivery of the primary product and included in the product development cost category for rapid prototype development, experimentation and demonstration cost categories.

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604030N / *Rapid Prototyping, Experimentation and Demonstrati* | **Project (Number/Name)**<br>0385 / *Rapid Prototype Development* |

| | FY 2017 | | | | FY 2018 | | | | FY 2019 | | | | FY 2020 | | | | FY 2021 | | | | FY 2022 | | | | FY 2023 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| ***Proj 0385*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Prototype Development, Experimentation and Demonstration | | | | | | | | | [redacted] | | | | | | | | | | | | | | | | | | | |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604030N / *Rapid Prototyping, Experimentation and Demonstrati* | **Project (Number/Name)**<br>0385 / *Rapid Prototype Development* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 0385*** | | | | |
| Prototype Development, Experimentation and Demonstration | 1 | 2019 | 4 | 2020 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0604031N *I Large Unmanned Undersea Vehicles* |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Program Element | 0.000 | 0.000 | 0.000 | 92.613 | - | 92.613 | 135.641 | 136.136 | 121.836 | 129.429 | Continuing | Continuing |
| 2094: *Unmanned Underwater Vehicle* | 0.000 | 0.000 | 0.000 | 92.613 | - | 92.613 | 135.641 | 136.136 | 121.836 | 129.429 | Continuing | Continuing |

**Note**

FY 2018 and prior funding in Program Element (PE) 0603502N. Project realigned from PE 0603502N starting in FY 2019.

**A. Mission Description and Budget Item Justification**

The Snakehead Large Displacement Unmanned Undersea Vehicle (LDUUV) is the Navy's Large Displacement UUV effort as part of the UUV Family of Systems (FOS). It is the number one Submarine-launched UUV priority due to the additional endurance and capability it will bring to the fleet in support of maintaining the Navy's undersea superiority. In order to accelerate future capability and support steady growth of the fleet's UUV FoS the Snakehead LDUUV program will design and build a modular, reconfigurable Unmanned Undersea Vehicle (UUV) with Open Architecture (OA) software (SW) focused on introducing a new class (large displacement) of UUVs to the Navy to provide increased endurance, payload hosting, and delivery capability.

The Snakehead LDUUV will be modular in design and include hotel functionality (guidance and control, navigation, autonomy, situational awareness, core communications, and power distribution), energy and power, propulsion and maneuvering, mission sensors, and communications links. It is intended that modules will have well defined interfaces for the purposes of implementing cost-effective upgrades in future increments to leverage advances in technology. The Snakehead LDUUV is a CNO/ASN(RDA) approved Accelerated Acquisition phased approach to build capabilities at a manageable level of risk in the Navy's class of Large Displacement Unmanned Undersea Vehicles. It currently consists of two phases of government-led development with significant industry involvement transitioning to industry production of the full vehicles.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 0.000 | 0.000 | 0.000 | - | 0.000 |
| Current President's Budget | 0.000 | 0.000 | 92.613 | - | 92.613 |
| Total Adjustments | 0.000 | 0.000 | 92.613 | - | 92.613 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | - | - | | | |
| • Rate/Misc Adjustments | 0.000 | 0.000 | 92.613 | - | 92.613 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0604031N *I Large Unmanned Undersea Vehicles* |

**Change Summary Explanation**

Program Changes: FY19 +$92,613K realigned from 0603502N, Project 2094.
Technical: Not applicable.
Schedule: Not applicable.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604031N / *Large Unmanned Undersea Vehicles* | Project (Number/Name)<br>2094 / *Unmanned Underwater Vehicle* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2094: *Unmanned Underwater Vehicle* | 0.000 | 0.000 | 0.000 | 92.613 | - | 92.613 | 135.641 | 136.136 | 121.836 | 129.429 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

FY 2018 and prior funding in Program Element (PE) 0603502N. Project moved from PE 0603502N starting in FY 2019.

**A. Mission Description and Budget Item Justification**

In order to accelerate future capability and support steady growth of the fleet's UUV Family of Systems (FoS) the Snakehead Large Displacement Unmanned Undersea Vehicle (LDUUV) program will design and build a modular, reconfigurable Unmanned Undersea Vehicle (UUV) with Open Architecture (OA) software (SW) focused on introducing a new class (large displacement) of UUVs to the Navy to provide increased endurance, payload hosting, and delivery capability.
The Snakehead LDUUV will be modular in design and include hotel functionality (guidance and control, navigation, autonomy, situational awareness, core communications, and power distribution), energy and power, propulsion and maneuvering, mission sensors, and communications links. It is intended that modules will have well defined interfaces for the purposes of implementing cost-effective upgrades in future increments to leverage advances in technology. The Snakehead LDUUV is a CNO/ASN(RDA) approved Accelerated Acquisition phased approach to build capabilities at a manageable level of risk in the Navy's class of Large Displacement Unmanned Undersea Vehicles. It consists of two phases of government-led development with significant industry involvement transitioning to industry production of the full vehicles.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** LDUUV Product Development | 0.000 | 0.000 | 81.695 | 0.000 | 81.695 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY 2018 funding in Program Element (PE) 0603502N. | | | | | |
| ***FY 2019 Base Plans:***<br>Complete detailed design for Phase I LDUUV and complete Critical Design Review (CDR) in 1QFY19.<br><br>Procure remaining materials and parts and commence fabrication of two (2) Phase I LDUUVs. Develop data products and<br>analysis for submarine and surface ship integration. Route technical data package for platform integration and adjudicate technical review. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604031N / *Large Unmanned Undersea Vehicles* | **Project (Number/Name)**<br>2094 / *Unmanned Underwater Vehicle* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Provide engineering services for initial subsystem testing and risk reduction demos.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2018 funding in Program Element (PE) 0603502N. FY 2019 increase in funding supports detailed design efforts. | | | | | |
| ***Title:*** LDUUV Support<br>***Articles:***<br>***FY 2018 Plans:***<br>FY 2018 funding in Program Element (PE) 0603502N.<br>***FY 2019 Base Plans:***<br>Complete final design documentation and drawings, submarine Interface Control Documents, and subsystem test plans to<br>assemble baseline technical data package for platform integration. Support fabrication and material efforts. Support<br>platform integration efforts. Continue supportability analysis.<br><br>Support Fleet with demonstration exercises with demo vehicles to develop Tactics, Techniques, and Procedures.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2018 funding in Program Element (PE) 0603502N. FY 2019 increase due to additional support for detailed design efforts. | 0.000<br>- | 0.000<br>- | 8.930<br>- | 0.000<br>- | 8.930<br>- |
| ***Title:*** LDUUV Management<br>***Articles:***<br>***FY 2018 Plans:***<br>FY 2018 funding in Program Element (PE) 0603502N.<br>***FY 2019 Base Plans:*** | 0.000<br>- | 0.000<br>- | 1.988<br>- | 0.000<br>- | 1.988<br>- |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604031N / *Large Unmanned Undersea Vehicles* | **Project (Number/Name)**<br>2094 / *Unmanned Underwater Vehicle* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Provide program management support and travel for the LDUUV program. Program management plans include overall<br>technical guidance and leadership for the program. Oversight of financial and logistics efforts and coordination with Navy and other DoD organizations and contractors as required to ensure successful execution of the program.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2018 funding in Program Element (PE) 0603502N. FY 2019 increase supports management of detailed design efforts. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 0.000 | 92.613 | 0.000 | 92.613 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • RDTEN/0603502N/2094: *Unmanned Underwater Vehicle* | 21.945 | 60.187 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 146.992 |

**Remarks**

Funding moved to new Program Element in FY2019

**D. Acquisition Strategy**

Utilizing Navy requirements to insert incremental capability, the LDUUV program will design, build, and test risk-reducing UUVs in two phases followed by competitive award of a production contract.

**E. Performance Metrics**

LDUUV - Complete Critical Design Review (CDR) 1Q FY19

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604031N / *Large Unmanned Undersea Vehicles* | **Project (Number/Name)**<br>2094 / *Unmanned Underwater Vehicle* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDUUV Vehicles, Hardware, & Design | WR | NUWC Newport : Newport, RI | 0.000 | 0.000 | | 0.000 | | 12.090 | Dec 2018 | - | | 12.090 | Continuing | Continuing | Continuing |
| LDUUV Vehicles, Hardware, & Design | C/CPFF | Various : Various | 0.000 | 0.000 | | 0.000 | | 46.258 | Dec 2018 | - | | 46.258 | Continuing | Continuing | Continuing |
| LDUUV Vehicles, Hardware, & Design | WR | NSWC Carderock : West Bethesda, MD | 0.000 | 0.000 | | 0.000 | | 3.254 | Dec 2018 | - | | 3.254 | Continuing | Continuing | Continuing |
| LDUUV Vehicles, Hardware, & Design | WR | NSWC Panama City : Panama City, FL | 0.000 | 0.000 | | 0.000 | | 0.200 | Dec 2018 | - | | 0.200 | Continuing | Continuing | Continuing |
| LDUUV Vehicles, Hardware, & Design | SS/CPFF | ARL PSU : Statte College, PA | 0.000 | 0.000 | | 0.000 | | 5.997 | Dec 2018 | - | | 5.997 | Continuing | Continuing | Continuing |
| LDUUV Vehicles, Hardware, & Design | WR | SSC Pacific : San Diego, CA | 0.000 | 0.000 | | 0.000 | | 0.495 | Jan 2019 | - | | 0.495 | Continuing | Continuing | Continuing |
| LDUUV Vehicles, Hardware, & Design | WR | NUWC Keyport : Keyport, WA | 0.000 | 0.000 | | 0.000 | | 4.887 | Jan 2019 | - | | 4.887 | Continuing | Continuing | Continuing |
| LDUUV Risk Reduction Soanr | SS/CPFF | ARL UT : Austin, TX | 0.000 | 0.000 | | 0.000 | | 0.647 | Feb 2019 | - | | 0.647 | Continuing | Continuing | Continuing |
| LDUUV Expirimentation and Risk Reduction - Battery Certification | WR | NSWC Crane : Crane, IN | 0.000 | 0.000 | | 0.000 | | 1.000 | Dec 2018 | - | | 1.000 | Continuing | Continuing | Continuing |
| LDUUV Platform Integration | Various | Various : Various | 0.000 | 0.000 | | 0.000 | | 6.867 | Dec 2018 | - | | 6.867 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 81.695 | | - | | 81.695 | Continuing | Continuing | N/A |

**Remarks**

FY 2018 and prior funding in Program Element (PE) 0603502N.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604031N / *Large Unmanned Undersea Vehicles* | Project (Number/Name)<br>2094 / *Unmanned Underwater Vehicle* | |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDUUV Engineering Support | WR | NUWC Newport : Newport, RI | 0.000 | 0.000 | | 0.000 | | 3.390 | Dec 2018 | - | | 3.390 | Continuing | Continuing | Continuing |
| LDUUV Launch and Recovery Engineering Support | WR | NSWC Panama City : Panama City, FL | 0.000 | 0.000 | | 0.000 | | 0.510 | Feb 2019 | - | | 0.510 | Continuing | Continuing | Continuing |
| LDUUV Hydrodynamics and Propulsion Engineering Support | C/CPFF | Various : Various | 0.000 | 0.000 | | 0.000 | | 1.088 | Dec 2018 | - | | 1.088 | Continuing | Continuing | Continuing |
| LDUUV Command and Control Engineering Support | WR | NSWC Carderock : West Bethsda, MD | 0.000 | 0.000 | | 0.000 | | 1.505 | Dec 2018 | - | | 1.505 | Continuing | Continuing | Continuing |
| LDUUV Engineering | WR | SSC Pacific : San Diego, CA | 0.000 | 0.000 | | 0.000 | | 0.468 | Dec 2018 | - | | 0.468 | Continuing | Continuing | Continuing |
| Need Item Text | SS/CPFF | APL/JHU : Laurel, MD | 0.000 | 0.000 | | 0.000 | | 0.469 | Jan 2019 | - | | 0.469 | Continuing | Continuing | Continuing |
| Need Item Text | WR | NUWC Keyport : Keyport, WA | 0.000 | 0.000 | | 0.000 | | 0.750 | Dec 2018 | - | | 0.750 | Continuing | Continuing | Continuing |
| Need Item Text | SS/CPFF | Various : Various | 0.000 | 0.000 | | 0.000 | | 0.750 | Feb 2019 | - | | 0.750 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 8.930 | | - | | 8.930 | Continuing | Continuing | N/A |

**Remarks**

FY 2018 and prior funding in Program Element (PE) 0603502N.

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDUUV Program Management | C/BA | NUWC Newport : Newport, RI | 0.000 | 0.000 | | 0.000 | | 0.698 | Dec 2018 | - | | 0.698 | Continuing | Continuing | Continuing |
| LDUUV Program Management | Various | Various : Various | 0.000 | 0.000 | | 0.000 | | 1.115 | Dec 2018 | - | | 1.115 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604031N / *Large Unmanned Undersea Vehicles* | **Project (Number/Name)**<br>2094 / *Unmanned Underwater Vehicle* |

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDUUV Travel | Various | NAVSEA : Washington, DC | 0.000 | 0.000 | | 0.000 | | 0.175 | Dec 2018 | - | | 0.175 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 1.988 | | - | | 1.988 | Continuing | Continuing | N/A |

**Remarks**

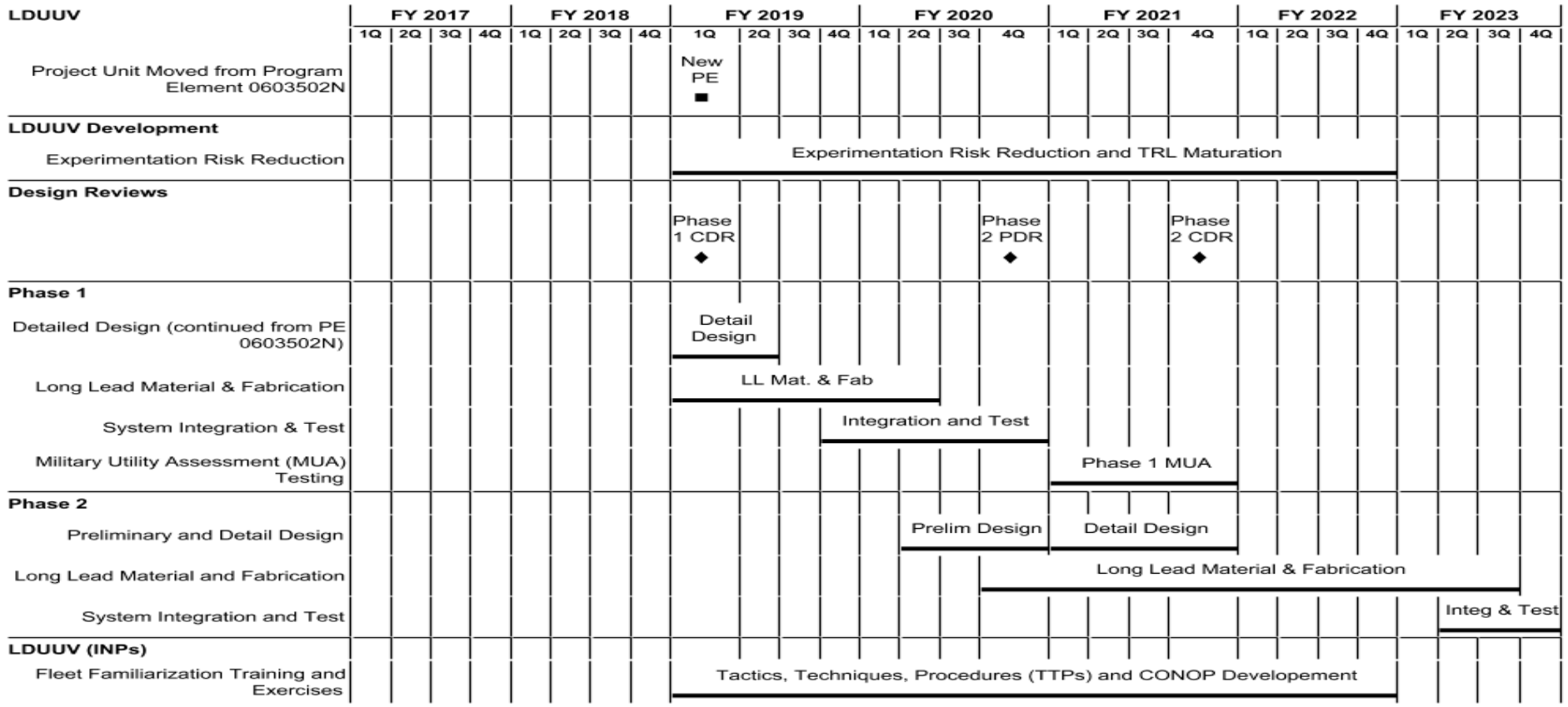
FY 2018 and prior funding in Program Element (PE) 0603502N.

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 0.000 | | 92.613 | | - | | 92.613 | Continuing | Continuing | N/A |

**Remarks**

FY 2018 and prior funding in Program Element (PE) 0603502N.

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604031N / *Large Unmanned Undersea Vehicles* | **Project (Number/Name)**<br>2094 / *Unmanned Underwater Vehicle* |




*2019PB - 0604031N - 2094*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604031N / *Large Unmanned Undersea Vehicles* | **Project (Number/Name)**<br>2094 / *Unmanned Underwater Vehicle* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***LDUUV*** | | | | |
| Project Unit Moved from Program Element 0603502N: | 1 | 2019 | 1 | 2019 |
| LDUUV Development: Experimentation Risk Reduction: | 1 | 2019 | 4 | 2022 |
| Design Reviews: Phase 1 CDR | 1 | 2019 | 1 | 2019 |
| Design Reviews: Phase 2 PDR | 4 | 2020 | 4 | 2020 |
| Design Reviews: Phase 2 CDR | 4 | 2021 | 4 | 2021 |
| Phase 1: Detailed Design (continued from PE 0603502N): | 1 | 2019 | 2 | 2019 |
| Phase 1: Long Lead Material & Fabrication: | 1 | 2019 | 2 | 2020 |
| Phase 1: System Integration & Test: | 4 | 2019 | 4 | 2020 |
| Phase 1: Military Utility Assessment (MUA) Testing: | 1 | 2021 | 4 | 2021 |
| Phase 2: Preliminary and Detail Design: Prelminary Design | 2 | 2020 | 4 | 2020 |
| Phase 2: Preliminary and Detail Design: | 1 | 2021 | 4 | 2021 |
| Phase 2: Long Lead Material and Fabrication: | 4 | 2020 | 3 | 2023 |
| Phase 2: System Integration and Test: | 2 | 2023 | 4 | 2023 |
| LDUUV (INPs): Fleet Familiarization Training and Exercises: | 1 | 2019 | 4 | 2022 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0604112N *I (U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 146.976 | 69.185 | 83.935 | 58.121 | - | 58.121 | 57.236 | 43.713 | 30.904 | 39.306 | Continuing | Continuing |
| 2208: *CVN 21* | 123.465 | 32.398 | 57.946 | 25.029 | - | 25.029 | 39.759 | 26.236 | 26.704 | 39.306 | Continuing | Continuing |
| 4004: *EMALS* | 23.511 | 36.787 | 25.989 | 33.092 | - | 33.092 | 17.477 | 17.477 | 4.200 | 0.000 | 0.000 | 158.533 |
| **Program MDAP/MAIS Code:**<br>**Project MDAP/MAIS Code(s):** 223 | | | | | | | | | | | | |

**A. Mission Description and Budget Item Justification**

The FY 2019 funding request was reduced by $.094 million to reflect the Department of Navy's effort to support the Office of Management and Budget directed reforms for Efficiency and Effectiveness that include a lean, accountable, more efficient government.

This Navy program addresses unique technologies on Ford Class carriers. The program includes:

- (2208) - Development of ship hull, mechanical, propulsion, electrical, aviation, and combat support systems, subsystems and components to significantly improve aircraft carrier affordability, manpower requirements, survivability, and operational capabilities, and to meet the requirements of existing and pending regulations and statutes critical to the operation of existing and future aircraft carriers.

- (4004) - Development of an advanced technology aircraft launch system in support of the CVN 78 Class design and construction schedule. The Electro Magnetic Aircraft Launch System (EMALS) will replace the current steam catapult on CVN 78 Class ships. EMALS provides better control of applied forces, both peak and transient dynamic, improved
reliability and maintainability, increased operational availability and reduced operator and maintainer workload.

This Program Element (PE) and associated projects represent a continuation of efforts previously funded under PE 0603512N projects 2208 and 4004 in FY 2014 and earlier.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | Date: February 2018 |
|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | R-1 Program Element (Number/Name)<br>PE 0604112N *I (U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80* | | |
| **B. Program Change Summary ($ in Millions)** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** |
| Previous President's Budget | 70.528 | 83.935 | 84.195 | - | 84.195 |
| Current President's Budget | 69.185 | 83.935 | 58.121 | - | 58.121 |
| Total Adjustments | -1.343 | 0.000 | -26.074 | - | -26.074 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -1.344 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | -25.394 | - | -25.394 |
| • Rate/Misc Adjustments | 0.001 | 0.000 | -0.680 | - | -0.680 |

**Change Summary Explanation**

FY19 - PROJ 2208 CVN 21: Removal of Full Ship Shock Trial (FSST) funding (-$42.5M)

FY19 - PROJ 4004 CVN 21: Addition of EMALS depot planning funding (+$17.2M)

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80* | Project (Number/Name)<br>2208 / *CVN 21* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2208: *CVN 21* | 123.465 | 32.398 | 57.946 | 25.029 | - | 25.029 | 39.759 | 26.236 | 26.704 | 39.306 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Project MDAP/MAIS Code:** 223

**A. Mission Description and Budget Item Justification**

This project provides for the development of aircraft carrier specific technologies, the infusion of the ship technology base into existing and future aircraft carriers, and the potential realization of subsystem design capabilities not currently feasible. This project transitions the most promising technologies from the Navy technology base, other government laboratories, and the private sector into specific advanced development efforts. All systems developed in this project have the potential to support emerging requirements and other promising systems technologies for insertion into new aircraft carrier designs. The emphasis is directed toward developing ship hull, mechanical, propulsion, electrical, aviation, warfare systems, and combat support systems, sub-systems and components to significantly improve aircraft carrier affordability, manpower requirements, survivability, and operational
capabilities and to meet the requirements of existing and pending regulations and statutes critical to the operation of future aircraft carriers. This project also encompasses those tasks required to support CVN 78 procurement, including, but not limited to engineering support, programmatic and program support, logistics support, modeling and simulation, test and evaluation, manpower and program related studies, and design support systems, such as the Integrated Digital Environment (IDE).

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** CVN 78 Class Advanced Technology Design & Development | 7.455 | 31.374 | 11.597 | 0.000 | 11.597 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** CVN 78 Class Advanced Technology Design & Development - Continue development and transition of technologies to support CVN 78 Class Key Performance Parameters (KPPs): maintain sortie generation rate, reductions in manpower, and further recovery of weight and stability service life margins. Continue design activities to integrate the new technologies, such as the new propulsion plant and Electromagnetic Aircraft Launch System into the ship. Complete shock qualification for components of all CVN 78 systems. | | | | | |
| ***FY 2018 Plans:***<br>Cyber-security: Continue developing CVN 78 cyber-security processes, requirements and solutions. Establish boundary defense for tactical, wire-free communication and video systems. Develop and maintain certification and accreditation packages for system support. Develop land-based test sites to conduct testing. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80* | **Project (Number/Name)**<br>2208 / *CVN 21* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Component Shock: Complete CVN 78 Government-Furnished Equipment (GFE) component / system shock qualification requirements. This effort will allow necessary NAVSEA post-delivery shock hardening certification of CVN 78 prior to its operational deployment.<br><br>The increase from FY2017 to FY2018 is due to the requirement for component shock qualification testing. Raytheon will be<br>performing shock qualification testing of Dual Band Radar (DBR). NSWC Philadelphia will have an increased workload<br>with significant shock test report review, test procedure review and test preparation assistance. SPAWAR is continuing its shock test efforts, with all testing to be completed by 4Q2018. Major systems to be component shock qualified are Navy Multiband Terminal (NMT), Digital Modular Radio (DMR), Tactical Variant Switch (TVS), Consolidated Afloat Network<br>Enterprise Services (CANES) Video, Radio Communication System (RCS), Automated Digital Network System (ADNS),<br>and Communications Data Link System (CDLS). There are also increasing requirements from Integrated Warfare Systems<br>that are required for Ship's Self Defense System (SSDS) and Guided Missile Launching System (GMLS) for qualification. | | | | | |
| ***FY 2019 Base Plans:***<br>Continue providing support to resolve issues identified during Post Shakedown Availability (PSA) on CVN 78 developmental systems.<br><br>Cyber-security: Continue developing CVN 78 cyber-security processes, requirements and solutions. Establish boundary defense for tactical, wire-free communication and video systems. Develop and maintain certification and accreditation packages for system support. Develop land-based test sites to conduct testing. Continue to implement WIN10 upgrades, development of connect / disconnect procedures as well as continue to develop Security Technical Implementation Guides and Information Assurance Technical Authority Board in time for installation during the FY 2020 Planned Incremental Availability.<br><br>Component Shock: Complete CVN 78 GFE component / system shock qualification requirements. This effort will allow necessary NAVSEA post-delivery shock hardening certification of CVN 78 prior to its operational deployment. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80* | **Project (Number/Name)**<br>2208 / *CVN 21* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Requirements in FY19 are for Raytheon to prepare and perform component shock testing of DBR elements, to include AN/SPY-4, AN/SPY-3, Receiver Exciter (REX), and processing rooms. NSWC Philadelphia will complete review of GFE shock test reports carried over from 4Q 2018 shock testing, provide guidance and approval for DBR test procedures, and review resulting DBR shock test reports.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Decrease due to removal of Full Ship Shock Trials. | | | | | |
| ***Title:*** CVN 21 - Test & Evaluation (T&E) | 24.943 | 26.572 | 13.432 | 0.000 | 13.432 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Continue Post Delivery Tests and Trials (PDT&T), Developmental Test Working Group (DTWG) and CVN 78 Integrated Test Team (CITT) efforts in support of Developmental Test / Integrated Test Phase 4 (DT/IT-4) completion. Perform oversight of FY 18 PDT&T and DT/IT-4 test event integration to address Developmental Test (DT) and Operational Test (OT) requirements. Major FY 18 PDT&T and DT/IT-4 test events include: (1) continued Combat Systems Shipboard Developmental Testing (CS SBDT) efforts; (2) continued cyber-security inspections and aircraft compatibility testing; (3) continued Special Performance Trials and Acoustic Trials and (4) completion of the development of the Sea-strike Sea-basing Aviation Model (SSAM) and data collection in support of model validation.<br><br>Continue PDT&T, DTWG, and CITT planning efforts in support of post-PSA DT/IT-5 integration testing and preparations for Initial Operational Test and Evaluation (IOT&E). Major post-PSA DT/IT-5 test events include: (1) obtaining post-PSA Platform (Afloat Site) (Interim) Authority to Operate (IATO / ATO) and post-PSA flight deck certification; (2) continuing to conduct CS SBDT, Radar Cross Section and Infrared measurements, degaussing and de-perming, cyber-security inspections, and aircraft compatibility testing; and (3) continuing to conduct Combat System Ship Qualification Trial (CSSQT).<br>***FY 2019 Base Plans:***<br>Complete PSA and achieve Initial Operational Capability (IOC). Continue PDT&T, DTWG and CITT efforts in support of DT/IT-5 integration testing. Continue DT/IT-5. The test events scheduled for DT/IT-5 in FY 19 include continuing DBR shipboard engineering and developmental testing; platform-level combat systems | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80* | **Project (Number/Name)**<br>2208 / *CVN 21* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| interoperability testing; platform-level C4I interoperability testing; CSSQT; structural test firings of Evolved Sea Sparrow Missile (ESSM) and Rolling Airframe Missile (RAM); Radar Cross Section (RCS) and Infrared (IR) measurements; degaussing and de-perming; cyber-security inspection; platform-level Hull, Mechanical and Electrical (HM&E) interoperability testing; platform-level aviation systems interoperability testing; and aircraft compatibility testing. Continue planning of Operational Testing, to include Operational Test Phase C1 (OT-C1) planned testing and begin detailed planning of scheduled OT-C2 test events.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Decrease due to removal of Full Ship Shock Trials. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 32.398 | 57.946 | 25.029 | 0.000 | 25.029 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • RDTEN / 0604567N: *Project Units 3108, 3179, 4007* | 68.892 | 54.131 | 50.110 | - | 50.110 | 46.566 | 45.327 | 46.226 | 47.200 | Continuing | Continuing |
| • SCN / 2001: *Carrier Replacement Program* | 2,626.567 | 4,441.772 | 1,598.181 | - | 1,598.181 | 2,146.535 | 3,239.606 | 2,910.491 | 3,378.355 | 10,602.689 | 50,900.224 |
| • SCN / 5300: *Completion of Prior Year Shipbuilding Programs* | 0.000 | 20.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1,394.860 |
| • OMN / 1B2B: *CVN 78 Ford Class Training and Sustainment (12BJ0)* | 17.536 | 14.008 | 9.043 | - | 9.043 | 8.150 | 6.346 | 6.907 | 7.054 | Continuing | Continuing |
| • OPN / 5664: *Surface Training Equipment* | 4.490 | 12.010 | 7.942 | - | 7.942 | 0.994 | 4.965 | 2.964 | 3.023 | Continuing | Continuing |
| • OMN / 1B1B: *Mission and Other Ship Operations (11B30)* | 24.000 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 24.000 |

**Remarks**

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80* | **Project (Number/Name)**<br>2208 / *CVN 21* |

**D. Acquisition Strategy**

The CVN 78 is the first ship of the CVN 78 Class of aircraft carriers designed to replace USS ENTERPRISE and the ships of the NIMITZ Class. The CVN 78 will feature a new nuclear propulsion and electrical generation/distribution system, EMALS, advanced arresting gear (AAG) system, all electric auxiliaries, warfare system improvements, survivability
enhancements, improved weapons handling, and improved aircraft servicing. These design features will result in lower manpower and total ownership costs as compared to the NIMITZ Class. Additionally, the following war fighting benefits will be realized: increased sortie generation rate, improved ship self-defense capability, increased launch and recovery
capability/flexibility, increased operational availability, and increased flexibility to support future upgrades.

**E. Performance Metrics**

Successfully complete development of TEMP 1610, Rev C and route for signature. Successfully complete all PEO C4I Test Integration Facility (TIF) testing. Successfully execute Sortie Generation Rate Assessment (SGRA) 12 and SGRA 13. Successfully conduct and support feasibility and tradeoff studies and data packages on new and modified shipboard systems, technologies and proposed modification. Data packages shall include information to support program decisions to integrate these efforts into the whole ship design efforts. Successfully conduct IDC shock testing and reporting in order to finalize IDC R&D efforts. Successfully complete Advanced Weapons Elevator Shock and Electromagnetic Interference (EMI) Test qualifications. Successfully complete Plasma Arc Waste Destruction System (PAWDS) Land-Based Test. Successfully create and deliver 21 Decision Memorandums (DM) for Bents/Bays 1-21 on the 03 Level (Gallery Deck) with Layer 31 information. Successfully develop the baseline Technical Data Packages for 39 systems and mature packages in preparation for final GFI arrival. Successfully complete component shock testing.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80* | **Project (Number/Name)**<br>2208 / *CVN 21* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Advanced Design & Development | C/CPAF | HII : VA | 2.786 | 1.821 | Nov 2016 | 2.825 | Nov 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Advanced Design & Development | WR | NSWC CARDEROCK : MD | 2.883 | 1.109 | Oct 2016 | 0.000 | | 0.500 | Oct 2018 | - | | 0.500 | Continuing | Continuing | Continuing |
| Advanced Design & Development | WR | NAWC PATUXENT RIVER : MD | 3.893 | 1.188 | Oct 2016 | 0.000 | | 0.250 | Oct 2018 | - | | 0.250 | Continuing | Continuing | Continuing |
| Advanced Design & Development | WR | NSWC DAHLGREN : VA | 4.252 | 0.515 | Nov 2016 | 0.000 | | 0.500 | Oct 2018 | - | | 0.500 | Continuing | Continuing | Continuing |
| Advanced Design & Development | C/CPAF | RAYTHEON : VA | 8.053 | 1.188 | Dec 2016 | 10.100 | Nov 2017 | 9.479 | Oct 2018 | - | | 9.479 | Continuing | Continuing | Continuing |
| Advanced Design & Development | C/CPFF | NAVSEA SEAPORT : DC | 13.164 | 1.386 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Advanced Design & Development | Various | MISCELLANEOUS : VARIOUS | 3.640 | 0.248 | Nov 2016 | 7.538 | Nov 2017 | 0.250 | Nov 2018 | - | | 0.250 | Continuing | Continuing | Continuing |
| Advanced Design & Development | WR | NSWC PHILADELPHIA : PA | 9.519 | 0.000 | | 4.543 | Nov 2017 | 0.618 | Oct 2018 | - | | 0.618 | Continuing | Continuing | Continuing |
| Advanced Design & Development | WR | SPAWAR : CA | 1.178 | 0.000 | | 6.368 | Nov 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Advanced Design & Development | WR | NSWC CORONA : CA | 1.189 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Advanced Design & Development | WR | NAWC LAKEHURST : NJ | 5.204 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 5.204 | - |
| | | **Subtotal** | 55.761 | 7.455 | | 31.374 | | 11.597 | | - | | 11.597 | Continuing | Continuing | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Development Test & Evaluation | C/CPAF | HII : VA | 4.356 | 0.834 | Nov 2016 | 1.338 | Nov 2017 | 0.165 | Nov 2018 | - | | 0.165 | Continuing | Continuing | Continuing |
| Development Test & Evaluation | WR | NAWC PATUXENT RIVER : MD | 5.242 | 3.878 | Oct 2016 | 1.576 | Nov 2017 | 0.403 | Nov 2018 | - | | 0.403 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80* | Project (Number/Name)<br>2208 / *CVN 21* | |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Development Test & Evaluation | WR | NSWC DAHLGREN : VA | 5.646 | 3.911 | Oct 2016 | 5.034 | Nov 2017 | 1.648 | Nov 2018 | - | | 1.648 | Continuing | Continuing | Continuing |
| Development Test & Evaluation | WR | NSWC CARDEROCK : MD | 18.817 | 0.597 | Oct 2016 | 6.048 | Nov 2017 | 0.533 | Nov 2018 | - | | 0.533 | Continuing | Continuing | Continuing |
| Development Test & Evaluation | WR | SPAWAR : CA | 4.020 | 0.696 | Nov 2016 | 0.000 | | 0.040 | Nov 2018 | - | | 0.040 | Continuing | Continuing | Continuing |
| Development Test & Evaluation | C/CPAF | RAYTHEON : VA | 6.158 | 1.716 | Dec 2016 | 1.475 | Dec 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Development Test & Evaluation | WR | SSC ATLANTIC : SC | 0.025 | 0.832 | Nov 2016 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Development Test & Evaluation | Various | MISCELLANEOUS : VARIOUS | 1.315 | 0.346 | Dec 2016 | 4.681 | Dec 2017 | 1.366 | Oct 2018 | - | | 1.366 | Continuing | Continuing | Continuing |
| Development Test & Evaluation | C/CPFF | NAVSEA SEAPORT : DC | 0.616 | 0.000 | | 1.100 | Nov 2017 | 1.469 | Nov 2018 | - | | 1.469 | Continuing | Continuing | Continuing |
| Development Test & Evaluation | C/BA | NSWC PORT HUENEME : CA | 0.182 | 0.590 | Dec 2016 | 0.000 | | 0.799 | Oct 2018 | - | | 0.799 | Continuing | Continuing | Continuing |
| Development Test & Evaluation | C/BA | NSWC CORONA : CA | 0.182 | 1.436 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Development Test & Evaluation | WR | NAWC LAKEHURST : NJ | 2.821 | 0.000 | | 1.680 | Nov 2017 | 0.200 | Nov 2018 | - | | 0.200 | Continuing | Continuing | Continuing |
| Development Test & Evaluation | WR | NSWC PHILADELPHIA : PA | 0.434 | 0.000 | | 1.200 | Nov 2017 | 3.124 | Nov 2018 | - | | 3.124 | Continuing | Continuing | Continuing |
| Operational Test & Evaluation | WR | COMOPTEVFOR : VA | 5.044 | 10.107 | Dec 2016 | 2.440 | Nov 2017 | 2.904 | Nov 2018 | - | | 2.904 | Continuing | Continuing | Continuing |
| Operational Test & Evaluation | WR | NAWC PATUXENT RIVER : MD | 0.138 | 0.000 | | 0.000 | | 0.150 | Oct 2018 | - | | 0.150 | Continuing | Continuing | Continuing |
| Development Test & Evaluation | C/CPFF | GRYPHON (SEI&T) : IN | 0.000 | 0.000 | | 0.000 | | 0.631 | Dec 2018 | - | | 0.631 | 0.000 | 0.631 | - |
| Development Test & Evaluation | C/CPFF | GENERAL ATOMICS : CA | 10.708 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 10.708 | - |
| Development Test & Evaluation | C/CPAF | BOEING : VA | 0.400 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.400 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80* | Project (Number/Name)<br>2208 / *CVN 21* | |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Development Test & Evaluation | C/CPFF | BECHTEL : PA | 1.600 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.600 | - |
| | | **Subtotal** | 67.704 | 24.943 | | 26.572 | | 13.432 | | - | | 13.432 | Continuing | Continuing | N/A |

**Remarks**

All Prior Years figures include the funding amounts from the FY 16 Congressional Add.

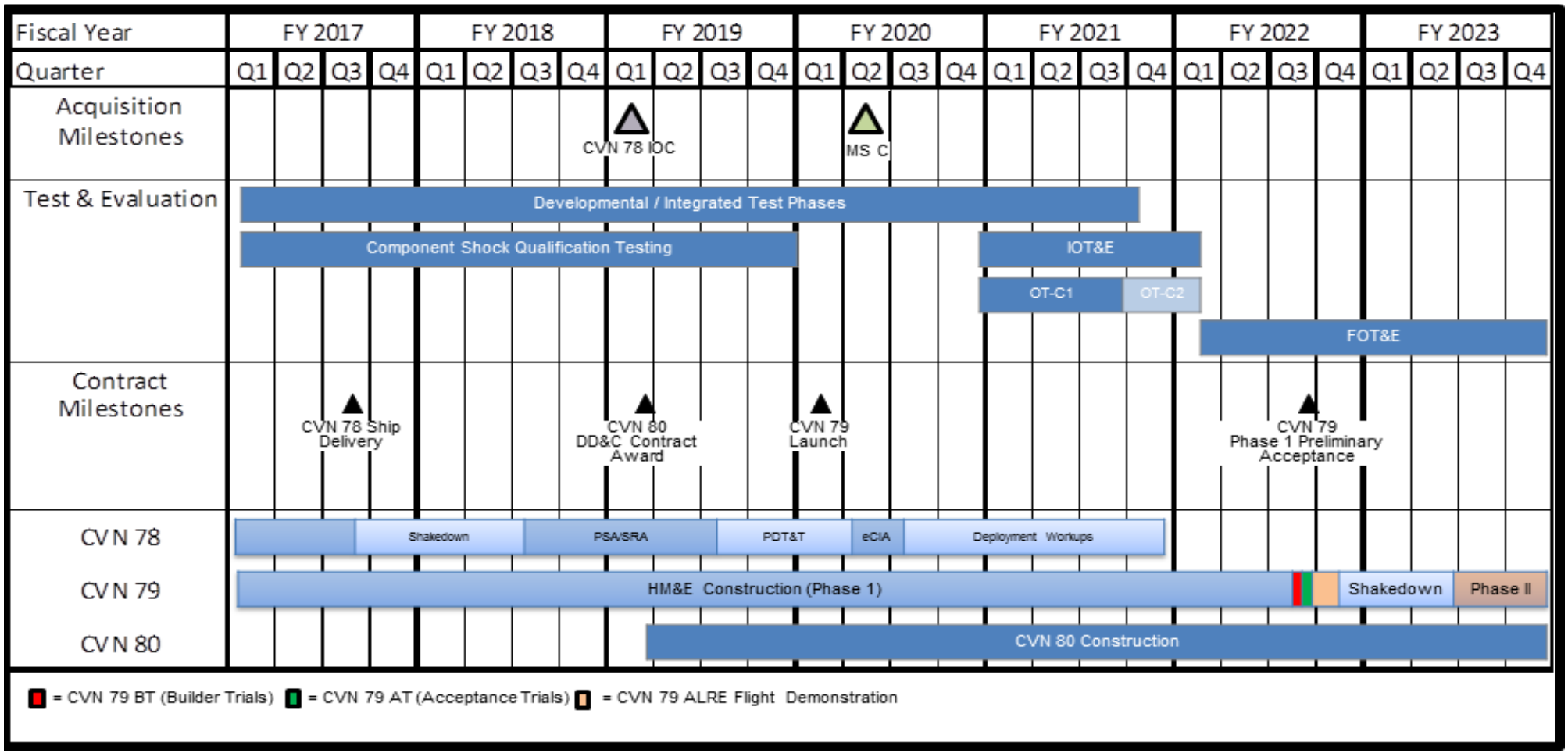
NSWC Philadelphia Cost Growth - Testing on CVN 78 is projected to increase in FY19 after the ship comes out of Post Shakedown Availability. The ship will be underway for nine (9) Independent Steaming Events and will conduct extensive testing and certification, particularly of Hull, Mechanical & Electrical (HM&E) systems. The additional funding to NSWC PD will fund HM&E Subject Matter Experts to evaluate, summarize and assess these test results against operational testing Measures of Effectiveness and Measures of Suitability. This will allow the program to identify areas of concern and to mitigate risk prior to entering operational testing.

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 123.465 | 32.398 | | 57.946 | | 25.029 | | - | | 25.029 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80* | **Project (Number/Name)**<br>2208 / *CVN 21* |

## Gerald R. Ford Class Carriers



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80* | **Project (Number/Name)**<br>2208 / *CVN 21* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 2208*** | | | | |
| Initial Operational Capability | 1 | 2019 | 1 | 2019 |
| Milestone C | 2 | 2020 | 2 | 2020 |
| Component Shock Qualification Testing | 1 | 2017 | 4 | 2019 |
| Initial Operational Test & Evaluation | 4 | 2020 | 1 | 2022 |
| CVN 80 Construction Contract Award | 1 | 2019 | 1 | 2019 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80* | Project (Number/Name)<br>4004 / *EMALS* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4004: *EMALS* | 23.511 | 36.787 | 25.989 | 33.092 | - | 33.092 | 17.477 | 17.477 | 4.200 | 0.000 | 0.000 | 158.533 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Project MDAP/MAIS Code:** 223

**A. Mission Description and Budget Item Justification**

This project provides for the development of an advanced technology aircraft launch system in support of the CVN 78 design and construction schedule, as well as Engineering and Life Cycle System (E&LCS) design. The Electromagnetic Aircraft Launch System (EMALS) will be the aircraft catapult for CVN 78 Class ships. EMALS provides better control of applied forces, both peak and transient dynamic, improved reliability and maintainability, increased operational availability, and reduced operator and maintainer workload.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** EMALS | 36.787 | 25.989 | 33.092 | 0.000 | 33.092 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** EMALS | | | | | |
| ***FY 2018 Plans:***<br>Continue EMALS Integrated Test & Evaluation (IT&E) land-based testing using deadloads and aircraft for the correction of deficiencies, critical reliability growth to achieve fleet operational requirements and to maintain test unit cycles above shipboard cycles. Conduct Environmental Qualification Testing (EQT) for Launch Control Subsystem (LCS) components deferred from System Development & Demonstration (SDD) and conduct EMALS component shock testing. Maintain EMALS shore-based test site to support: engineering investigations, software integration, deficiency resolution, component obsolescence regression test, and cyber security assessment/mitigation. Complete development of formal curriculum fleet operations and maintenance training. Continue the development of schoolhouse training systems for future Ford Class Aircraft Carrier personnel. Provide interim training for crews until formal schoolhouse training is established. | | | | | |
| ***FY 2019 Base Plans:***<br>Continue EMALS Integrated Test & Evaluation (IT&E) land-based testing using deadloads for the correction of deficiencies. Complete Environmental Qualification Testing (EQT) for Launch Control Subsystem (LCS) components deferred from System Development & Demonstration (SDD) and EMALS component shock testing. Maintain EMALS shore-based test site to support: engineering investigations, software integration, deficiency resolution, component obsolescence regression test, and cyber security assessment/mitigation. Complete the | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80* | **Project (Number/Name)**<br>4004 / *EMALS* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| development of schoolhouse training systems for Ford Class Aircraft Carrier personnel. Provide interim training for crews until formal schoolhouse training is established. Begin the development of the required processes and procedures to plan for Depot Level activities. Initiate the planning and analysis necessary to standup EMALS Depot Level maintenance, overhaul and repair facility/facilities for EMALS components.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>The increase from FY 2018 to FY 2019 supports the development of EMALS depot level maintenance. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 36.787 | 25.989 | 33.092 | 0.000 | 33.092 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • RDTEN / 0604567N: *Project Units 3108, 3179, 4007* | 68.892 | 54.131 | 50.110 | - | 50.110 | 46.566 | 45.327 | 46.226 | 47.200 | Continuing | Continuing |
| • SCN / 2001: *Carrier Replacement Program* | 2,626.567 | 4,441.772 | 1,598.181 | - | 1,598.181 | 2,146.535 | 3,239.606 | 2,910.491 | 3,378.355 | 10,602.689 | 50,900.224 |
| • SCN / 5300: *Completion of Prior Year Shipbuilding Programs* | 0.000 | 20.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1,394.860 |
| • OMN / 1B2B: *CVN 78 Ford Class Training and Sustainment (12BJ0)* | 17.536 | 14.008 | 9.043 | - | 9.043 | 8.150 | 6.346 | 6.907 | 7.054 | Continuing | Continuing |
| • OPN / 5664: *Surface Training Equipment* | 4.490 | 12.010 | 7.942 | - | 7.942 | 0.994 | 4.965 | 2.964 | 3.023 | Continuing | Continuing |
| • OPN / 4213: *Aircraft Support Equipment* | 81.428 | 63.695 | 65.459 | - | 65.459 | 95.441 | 72.816 | 73.371 | 83.861 | Continuing | Continuing |
| • OMN / 1B1B: *Mission and Other Ship Operations (11B30)* | 21.000 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 21.000 |

**Remarks**

OPN 4213 includes a portion of line item funding for Electro Magnetic Aircraft Launch System (EMALS).

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80* | **Project (Number/Name)**<br>4004 / *EMALS* |

**D. Acquisition Strategy**

The CVN 78 is the first ship of the CVN 78 Class of aircraft carriers designed to replace USS ENTERPRISE and the ships of the NIMITZ Class. The CVN 78 will feature a new nuclear propulsion and electrical generation/distribution system, new electromagnetic aircraft launching system (EMALS), advanced arresting gear (AAG) system, all electric auxiliaries, warfare system improvements, survivability enhancements, improved weapons handling, and improved aircraft servicing. These design features will result in lower manpower and total ownership costs as compared to the NIMITZ Class. Additionally, the following war fighting benefits will be realized: increased sortie generation rate, improved ship self-defense capability, increased launch and recovery capability/flexibility, increased operational availability, and increased flexibility to support future upgrades.

**E. Performance Metrics**

Successfully complete System Functional Demonstration (SFD) testing. Successfully complete Environmental Qualification Testing (EQT). Successfully complete Shipset Controls Lab testing. Successfully complete Integrated Test and Evaluation (IT&E) including Environmental Qualification Testing (EQT), correction of deficiencies, reliability growth and shock testing.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80* | **Project (Number/Name)**<br>4004 / *EMALS* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Primary HW Development - SDD | C/CPFF | General Atomics : San Diego, CA | 0.000 | 22.746 | Nov 2016 | 9.200 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 31.946 | 31.945 |
| Training Development | C/FFP | Pro-Active Technologies, Inc : Oviedo, FL | 0.000 | 5.200 | Aug 2017 | 1.865 | Jul 2018 | 0.000 | | - | | 0.000 | 0.000 | 7.065 | 7.065 |
| Primary HW Development | WR | NAWCAD Lakehurst : Lakehurst, NJ | 0.000 | 3.220 | Nov 2016 | 2.852 | Nov 2017 | 1.264 | Nov 2018 | - | | 1.264 | 0.000 | 7.336 | - |
| Prior Year Cost No Longer Funded in FYDP | Various | Various : Various | 19.020 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 19.020 | - |
| | | **Subtotal** | 19.020 | 31.166 | | 13.917 | | 1.264 | | - | | 1.264 | 0.000 | 65.367 | N/A |

**Remarks**

FY17 Cost Categories updated to reflect actuals, current estimates and execution plans. FY18 and FY19 Cost Categories added to provide updated plans for Training Systems estimates.

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Government Engineering Support | WR | Various : Various | 0.000 | 0.144 | Feb 2017 | 0.115 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.259 | - |
| Training Support | WR | NAWCAD TSD : Orlando, FL | 0.000 | 0.296 | Feb 2017 | 0.355 | Nov 2017 | 0.295 | Nov 2018 | - | | 0.295 | 0.000 | 0.946 | - |
| Training Support | WR | NAWCAD Lakehurst : Lakehurst, NJ | 0.000 | 0.000 | | 1.749 | Nov 2017 | 0.695 | Nov 2018 | - | | 0.695 | 0.000 | 2.444 | - |
| Depot Logistics Development | TBD | General Atomics : San Diego, CA | 0.000 | 0.000 | | 0.000 | | 15.936 | Jan 2019 | - | | 15.936 | 36.100 | 52.036 | 52.036 |
| Government Eng Support | WR | NAWCAD Lakehurst : Lakehurst, NJ | 0.000 | 0.000 | | 0.000 | | 1.116 | Nov 2018 | - | | 1.116 | 3.054 | 4.170 | - |
| | | **Subtotal** | 0.000 | 0.440 | | 2.219 | | 18.042 | | - | | 18.042 | 39.154 | 59.855 | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80* | Project (Number/Name)<br>4004 / *EMALS* | |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

**Remarks**

Support cost elements added to reflect actuals for FY17 and to provide a more detailed breakout of FY18 and FY19 plans for government engineering and Training Support related to IT&E and Training Systems Development. FY19 plans added to support Depot Planning efforts.

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Integrated Test & Evaluation | WR | NAWC Lakehurst : Lakehurst, NJ | 0.000 | 3.232 | Nov 2016 | 3.474 | Nov 2017 | 1.699 | Nov 2018 | - | | 1.699 | 0.000 | 8.405 | - |
| Integrated Test & Evaluation | C/CPFF | General Atomics : San Diego, CA | 0.000 | 0.000 | | 3.934 | Dec 2017 | 12.087 | Nov 2018 | - | | 12.087 | 0.000 | 16.021 | 16.021 |
| Developmental T&E | SS/CPFF | The Boeing Company : St. Louis, MO | 0.000 | 1.949 | Mar 2017 | 2.445 | Jun 2018 | 0.000 | | - | | 0.000 | 0.000 | 4.394 | 4.394 |
| Prior Year Cost No Longer Funded in FYDP | Various | Various : Various | 4.491 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 4.491 | - |
| | | **Subtotal** | 4.491 | 5.181 | | 9.853 | | 13.786 | | - | | 13.786 | 0.000 | 33.311 | N/A |

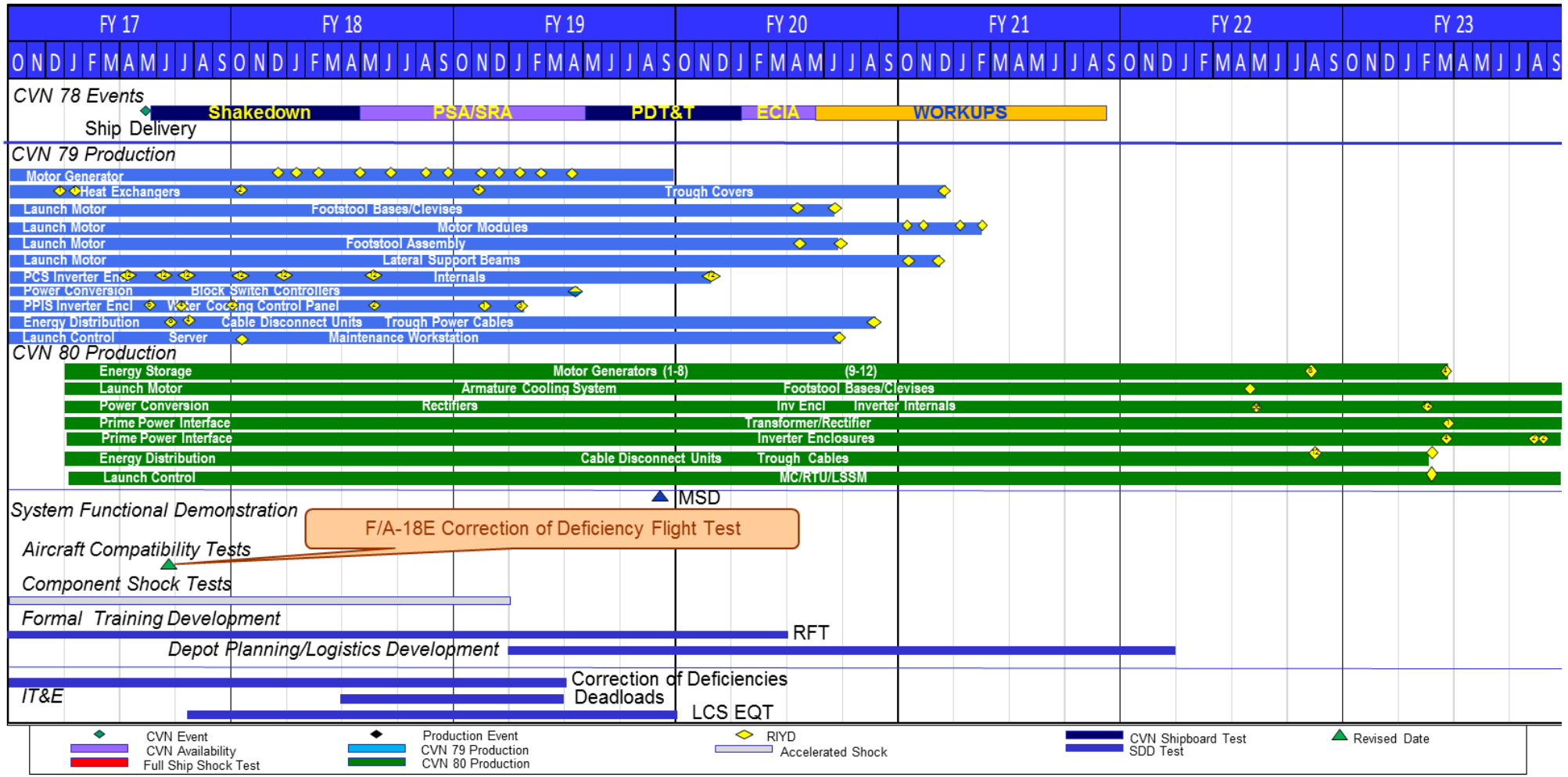
**Remarks**

FY17 updated for actuals. FY18 was updated to reflect current estimates and new cost category to support deadload and aircraft testing for the correction of deficiencies Integrated Test & Evaluation (IT&E). The increase from FY18 to FY19 supports Integrated Test & Evaluation deadload testing for correction of deficiencies, Environmental Qualification Testing (EQT) for Launch Control Subsystem (LCS) components, EMALS component shock testing and the transition out of SDD to IT&E.

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 23.511 | 36.787 | | 25.989 | | 33.092 | | - | | 33.092 | 39.154 | 158.533 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80* | **Project (Number/Name)**<br>4004 / *EMALS* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80* | **Project (Number/Name)**<br>4004 / *EMALS* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 4004*** | | | | |
| EMALS SDD Complete | 4 | 2018 | 4 | 2018 |
| EMALS Integrated Test & Evaluation (IT&E) | 1 | 2017 | 1 | 2020 |
| EMALS Component Shock Test | 1 | 2017 | 1 | 2019 |
| EMALS Launch Control Subsystem (LCS) Environmental Qualification Testing (EQT) | 4 | 2017 | 4 | 2019 |
| EMALS Depot Level Planning | 2 | 2019 | 1 | 2022 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0604122N *I (U)Remote Minehunting System (RMS)* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 37.474 | 2.926 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 40.400 |
| 0260: *Remote Minehunting Systems* | 37.474 | 2.926 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 40.400 |
| **Program MDAP/MAIS Code:**<br>**Project MDAP/MAIS Code(s):** 286 | | | | | | | | | | | | |

**A. Mission Description and Budget Item Justification**

The AN/WLD-1(V) 2 Remote Minehunting System (RMS) was a mine reconnaissance system designed for the detection, classification, identification, and localization of bottom and moored mines in shallow and deep water.

As a result of the Department's Independent Review Team (IRT)the RMS program of record was cancelled.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 3.001 | 0.000 | 0.000 | - | 0.000 |
| Current President's Budget | 2.926 | 0.000 | 0.000 | - | 0.000 |
| Total Adjustments | -0.075 | 0.000 | 0.000 | - | 0.000 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -0.075 | 0.000 | | | |
| • Rate/Misc Adjustments | 0.000 | 0.000 | 0.000 | - | 0.000 |

**Change Summary Explanation**

Program Adjustments:

FY17 - $75K SBIR assessment

FY18 - N/A

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604122N / *(U)Remote Minehunting System (RMS)* | Project (Number/Name)<br>0260 / *Remote Minehunting Systems* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0260: *Remote Minehunting Systems* | 37.474 | 2.926 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 40.400 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Project MDAP/MAIS Code:** 286

**A. Mission Description and Budget Item Justification**

The AN/WLD-1(V)2 Remote Minehunting System (RMS) was a mine reconnaissance system designed for the detection, classification, identification, and localization of bottom and moored mines in shallow and deep water.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Support | 2.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>N/A | | | | | |
| ***FY 2019 Base Plans:***<br>N/A | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No change from FY 2018 to FY 2019. | | | | | |
| ***Title:*** Management | 0.926 | 0.000 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>N/A | | | | | |
| ***FY 2019 Base Plans:***<br>N/A | | | | | |
| ***FY 2019 OCO Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604122N / *(U)Remote Minehunting System (RMS)* | **Project (Number/Name)**<br>0260 / *Remote Minehunting Systems* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>No change from FY 2018 to FY 2019. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 2.926 | 0.000 | 0.000 | 0.000 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

An RMMV LRIP 1 Integration/Maintenance Contract was awarded in FY15 to support the integration and maintenance activities of LRIP 1 systems, integration with the LCS Freedom Variant, incorporate Ao improvements, and address obsolescence changes.

**E. Performance Metrics**

N/A

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604122N / *(U)Remote Minehunting System (RMS)* | Project (Number/Name)<br>0260 / *Remote Minehunting Systems* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hardware Development & Integration | Various | LOCKHEED MARTIN : West Palm Beach, FL | 24.338 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 24.338 | - |
| SBIR Transition | Various | Various : Various | 1.628 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.628 | - |
| Hardware Development & Integration | C/FPIF | LOOKHEED MARTIN : West Palm Beach, FL | 1.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.000 | - |
| | | **Subtotal** | 26.966 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 26.966 | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Engineering/ILS | WR | NSWC/PCD : Panama City, FL | 5.205 | 1.750 | Oct 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 6.955 | - |
| Engineering Support | WR | NUWC/NPT : Newport, RI | 0.744 | 0.250 | Nov 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.994 | - |
| Engineering Support | WR | PORTSMOUTH NSY : Portsmouth, NH | 0.521 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.521 | - |
| | | **Subtotal** | 6.470 | 2.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 8.470 | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LCS MCM MP Test Events | WR | NSWC/PCD : Panama City, FL | 1.537 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.537 | - |
| LCS MCM MP Test Events | SS/CPIF | LOCKHEED MARTIN : West Palm Beach, FL | 0.763 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.763 | - |
| | | **Subtotal** | 2.300 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.300 | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604122N / *(U)Remote Minehunting System (RMS)* | Project (Number/Name)<br>0260 / *Remote Minehunting Systems* | |

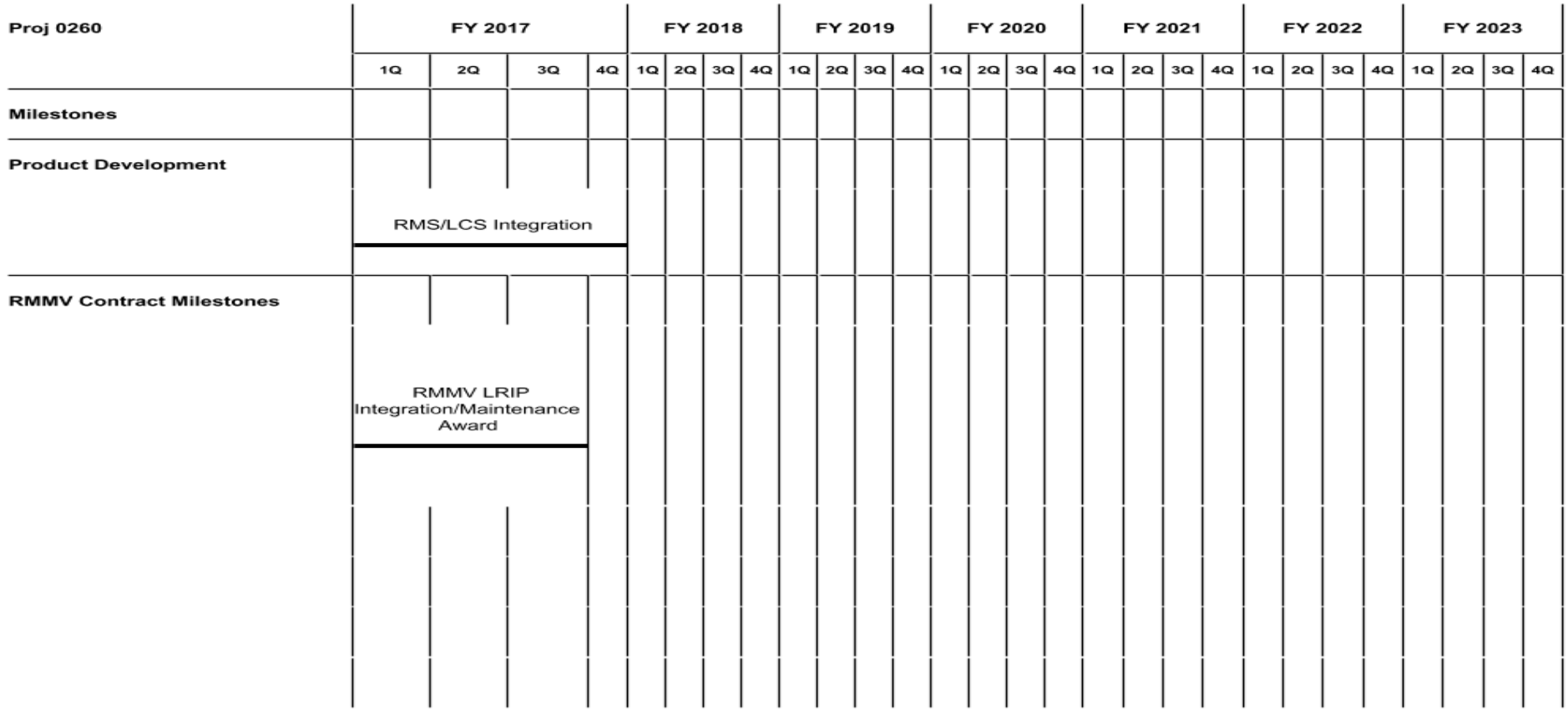
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Management Support | C/CPFF | TBD : TBD | 1.647 | 0.926 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.573 | - |
| Travel | WR | NAVSEA : WNY, DC | 0.091 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.091 | - |
| | | **Subtotal** | 1.738 | 0.926 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.664 | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 37.474 | 2.926 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 40.400 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604122N / *(U)Remote Minehunting System (RMS)* | **Project (Number/Name)**<br>0260 / *Remote Minehunting Systems* |




*2019DON - 0604122N - 0260*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604122N / *(U)Remote Minehunting System (RMS)* | **Project (Number/Name)**<br>0260 / *Remote Minehunting Systems* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 0260*** | | | | |
| Product Development: RMS/LCS Integration | 1 | 2017 | 4 | 2017 |
| RMMV Contract Milestones: RMMV LRIP Integration/Maintenance (Legacy Configuration) Award | 1 | 2017 | 3 | 2017 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0604126N *I Littoral Airborne MCM* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 0.000 | 0.000 | 0.000 | 17.622 | - | 17.622 | 20.348 | 17.041 | 17.399 | 17.761 | Continuing | Continuing |
| 2131: *Assault Breaching System* | 0.000 | 0.000 | 0.000 | 17.622 | - | 17.622 | 20.348 | 17.041 | 17.399 | 17.761 | Continuing | Continuing |

**Note**

FY 2018 and prior funding for this program was funded in PE 0603502N, Project 2131.

**A. Mission Description and Budget Item Justification**

This program provides a combination of U.S. Navy systems to counter the threat to amphibious forces from obstacles and anti-landing/sea mines in the Beach Zone and Surf Zone (0-10 ft water). The Assault Breaching Systems (ABS) consist of a system of systems approach that includes the following programs: JABS - Joint Direct Attack Munition (JDAM) Assault Breaching System; CMS - Countermine System; COBRA - Coastal Battlefield Reconnaissance and Analysis; PNMS - Precision Navigation and Marking System; and C4I - Command, Control, Computers, Communications, and Intelligence. The Assault Breaching Systems enable the Navy-Marine Corps team to conduct Joint Forcible Entry Operations (JFEO), Ship-To-Objective Maneuver (STOM), and other combat operations to project power ashore.

The JDAM Assault Breaching System (JABS) is a currently fielded system that neutralizes surface mines and obstacles in the Beach Zone and Surf Zone. The ABS Tactical Decision Aid optimizes the Desired Points of Impact (DPI) for JDAM munitions to effectively neutralize mines and obstacles while minimizing the required number of munitions and friendly aircraft sorties. Continued testing is required to optimize the ABS Tactical Decision Aid database for the most common enemy mines and obstacles.

Coastal Battlefield Reconnaissance and Analysis (COBRA) is the ABS program to conduct ISR/T. This system provides Airborne Mine Countermeasures (AMCM) capability, and one system consists of two Airborne Payloads and one Post Mission Analysis Station. Block I is a multispectral sensor capable of daytime detection of surface-laid minefields and obstacles in the Beach Zone and adds on-board near real-time processing. Block II capability adds a 3D LIDAR (Light Detection and Ranging) sensor that enables nighttime detection of mines and obstacles in the Beach Zone and the Surf Zone (0-10 ft of water). Block II also adds on-board real-time processing of multispectral imagery data. COBRA consists of a modular payload architecture that can be integrated onto the MQ-8B Fire Scout or USN manned helicopters like the MH-60. COBRA will serve as the "detect" mission module in the Surf Zone and Beach Zone for the Littoral Combat Ship (LCS) Mine Warfare mission package.

Precision Navigation & Marking System (PNMS) provides navigational upgrades for the Landing Craft, Air Cushion (LCAC); Landing Craft, Utility (LCU); and Amphibious Assault Vehicle (AAV). A system of virtual lane marking improves the navigation ability of these three assault craft which enables them to navigate safely through the neutralized assault lanes provided by JABS and CMS. OPN funds the CRAFTALTS to upgrade the navigation systems. LCU Navigation Upgrade: Modernized the navigation system to enable safe transit through the breached lane. LCAC Autopilot Upgrade: An integrated improvement to the LCAC Service Life Extension Program (SLEP) navigation system for craft control that allows precise navigation and hovering within the breached lane. These software upgrades and backfits occur during scheduled LCAC SLEPs. AAV Navigation Upgrade : Modernize the navigation system to enable precise transit through the breached lane.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0604126N *I Littoral Airborne MCM* |

Command, Control, Computers, Communications and Intelligence (C4I) system will tie all of the above systems together under an integrated ABS architecture that is compatible with the existing Mine Warfare architecture.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 0.000 | 0.000 | 0.000 | - | 0.000 |
| Current President's Budget | 0.000 | 0.000 | 17.622 | - | 17.622 |
| Total Adjustments | 0.000 | 0.000 | 17.622 | - | 17.622 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | - | - | | | |
| • Rate/Misc Adjustments | 0.000 | 0.000 | 17.622 | - | 17.622 |

**Change Summary Explanation**

Technical: Not applicable.

Schedule: Not applicable.

FY 2019 funding for this program was realigned from PE 0603502N, Project 2131.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604126N / *Littoral Airborne MCM* | Project (Number/Name)<br>2131 / *Assault Breaching System* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2131: *Assault Breaching System* | 0.000 | 0.000 | 0.000 | 17.622 | - | 17.622 | 20.348 | 17.041 | 17.399 | 17.761 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

This program provides a combination of U.S. Navy systems to counter the threat to amphibious forces from obstacles and anti-landing/sea mines in the Beach Zone and Surf Zone (0-10 ft water). The Assault Breaching Systems (ABS) consist of a system of systems approach that includes the following programs: JABS - Joint Direct Attack Munition (JDAM) Assault Breaching System; CMS - Countermine System; COBRA - Coastal Battlefield Reconnaissance and Analysis; PNMS - Precision Navigation and Marking System; and C4I - Command, Control, Computers, Communications, and Intelligence. The Assault Breaching Systems enable the Navy-Marine Corps team to conduct Joint Forcible Entry Operations (JFEO), Ship-To-Objective Maneuver (STOM), and other combat operations to project power ashore.

The JDAM Assault Breaching System (JABS) is a currently fielded system that neutralizes surface mines and obstacles in the Beach Zone and Surf Zone. The ABS Tactical Decision Aid optimizes the Desired Points of Impact (DPI) for JDAM munitions to effectively neutralize mines and obstacles while minimizing the required number of munitions and friendly aircraft sorties. Continued testing is required to optimize the ABS Tactical Decision Aid database for the most common enemy mines and obstacles.

Coastal Battlefield Reconnaissance and Analysis (COBRA) is the ABS program to conduct ISR/T. This system provides Airborne Mine Countermeasures (AMCM) capability, and one system consists of two Airborne Payloads and one Post Mission Analysis Station. Block I is a multispectral sensor capable of daytime detection of surface-laid minefields and obstacles in the Beach Zone and adds on-board near real-time processing. Block II capability adds a 3D LIDAR (Light Detection and Ranging) sensor that enables nighttime detection of mines and obstacles in the Beach Zone and the Surf Zone (0-10 ft of water). Block II also adds on-board real-time processing of multispectral imagery data. COBRA consists of a modular payload architecture that can be integrated onto the MQ-8B Fire Scout or USN manned helicopters like the MH-60. COBRA will serve as the "detect" mission module in the Surf Zone and Beach Zone for the Littoral Combat Ship (LCS) Mine Warfare mission package.

Precision Navigation & Marking System (PNMS) provides navigational upgrades for the Landing Craft, Air Cushion (LCAC); Landing Craft, Utility (LCU); and Amphibious Assault Vehicle (AAV). A system of virtual lane marking improves the navigation ability of these three assault craft which enables them to navigate safely through the neutralized assault lanes provided by JABS and CMS. OPN funds the CRAFTALTS to upgrade the navigation systems. LCU Navigation Upgrade: Modernized the navigation system to enable safe transit through the breached lane. LCAC Autopilot Upgrade: An integrated improvement to the LCAC Service Life Extension Program (SLEP) navigation system for craft control that allows precise navigation and hovering within the breached lane. These software upgrades and backfits occur during scheduled LCAC SLEPs. AAV Navigation Upgrade : Modernize the navigation system to enable precise transit through the breached lane.

Command, Control, Computers, Communications and Intelligence (C4I) system will tie all of the above systems together under an integrated ABS architecture that is compatible with the existing Mine Warfare architecture.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604126N / *Littoral Airborne MCM* | **Project (Number/Name)**<br>2131 / *Assault Breaching System* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Product Development: | 0.000 | 0.000 | 11.647 | 0.000 | 11.647 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY 2018 funding for this program was funded in PE 0603502N, Project 2131.<br>***FY 2019 Base Plans:***<br>COBRA - Continue design and development of COBRA hardware and integration test planning of additional surf zone capabilities.<br>JABS - Continue design and engineering of weapon effectiveness for beach and surf zones.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY18 funding for this program was funded in PE 0603502N, Project 2131. | | | | | |
| ***Title:*** Technical Support: | 0.000 | 0.000 | 1.447 | 0.000 | 1.447 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY 2018 funding for this program was funded in PE 0603502N, Project 2131.<br>***FY 2019 Base Plans:***<br>COBRA - Continue to provide management and shipping, contract and test/studies, C4I Data Fusion. Provide technical /acquisition support and documentation (ILS, training, data, drawings).<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2018 funding for this program was funded in PE 0603502N, Project 2131. FY 2019 funding increase supports increased technical support required to meet Block II requirements. | | | | | |
| ***Title:*** Test and Evaluation: | 0.000 | 0.000 | 3.393 | 0.000 | 3.393 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604126N / *Littoral Airborne MCM* | **Project (Number/Name)**<br>2131 / *Assault Breaching System* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| FY 2018 funding for this program was funded in PE 0603502N, Project 2131.<br>***FY 2019 Base Plans:***<br>COBRA - Continue advance surf zone component/capability design and test.<br><br>JABS - Surf Zone (SZ) and Beach Zone (BZ) characterization testing.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2018 funding for this program was funded in PE 0603502N, Project 2131.FY 2019 funding increase supports increased technical support required to meet Block II requirements. | | | | | |
| ***Title:*** Management:<br>***Articles:***<br>***FY 2018 Plans:***<br>FY 2018 funding for this program was funded in PE 0603502N, Project 2131.<br>***FY 2019 Base Plans:***<br>Continue to manage Mine magazine inventory management and shipping, contract management and tests/ studies, C4I/Data fusion.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2018 funding for this program was funded in PE 0603502N, Project 2131. FY 2019 funding increase supports the COBRA program entering the second phase/block development cycle and to address the requirements captured in the COBRA Block II Capabilities Development Document (CDD). | 0.000<br>- | 0.000<br>- | 1.135<br>- | 0.000<br>- | 1.135<br>- |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 0.000 | 17.622 | 0.000 | 17.622 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • OPN/2624: *SHALLOW WATER Mine CM SHIP* | 8.875 | 8.796 | 8.616 | - | 8.616 | 8.730 | 5.595 | 5.703 | 5.811 | 0.000 | 100.599 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604126N / *Littoral Airborne MCM* | **Project (Number/Name)**<br>2131 / *Assault Breaching System* |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|

**Remarks**

**D. Acquisition Strategy**

Countermine/Counter Obstacle (CM/CO)is JDAM Assault Breaching System (JABS) and ABS Tactical Decision Aid testing is ongoing.

Intelligence/Surveillance/Reconnaissance/Targeting (ISR/T) - COBRA Block I achieved MS C in 3rd QTR FY 2009.

Precision Navigation & Marking System (PNMS) - The navigation upgrades for the Landing Craft, Air Cushion (LCAC) and Landing Craft, Utility (LCU) are complete. AAV enhancements will be achieved through an ECP (PMA AAV (Marine Corps)) in 1st QTR FY 2019.

**E. Performance Metrics**

Successful COBRA integration, flight tests: Operational Assessment (OA) and Development Testing (DT) into the MQ-8B FIRESCOUT. COBRA achieved IOC in FY 2017.

The above systems continue to meet or exceed their Key Performance Parameters.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604126N / *Littoral Airborne MCM* | Project (Number/Name)<br>2131 / *Assault Breaching System* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Primary Hardware Dev, COBRA | C/CPAF | Arete : Tucson, AZ | 0.000 | 0.000 | | 0.000 | | 8.082 | Dec 2018 | - | | 8.082 | Continuing | Continuing | Continuing |
| Systems Engineering, COBRA | WR | NSWC, PC : PANAMA CITY, FL | 0.000 | 0.000 | | 0.000 | | 1.200 | Nov 2018 | - | | 1.200 | Continuing | Continuing | Continuing |
| JABS | WR | NSWC PC : NSWC IH | 0.000 | 0.000 | | 0.000 | | 1.227 | Nov 2018 | - | | 1.227 | Continuing | Continuing | Continuing |
| Training Dev, COBRA | WR | NSWC, PC : PANAMA CITY, FL | 0.000 | 0.000 | | 0.000 | | 0.859 | Dec 2018 | - | | 0.859 | Continuing | Continuing | Continuing |
| ABS IPT/Test Assets/Proj Eng | WR | NSWC, PC : PANAMA CITY, FL | 0.000 | 0.000 | | 0.000 | | 0.279 | Dec 2018 | - | | 0.279 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 11.647 | | - | | 11.647 | Continuing | Continuing | N/A |

**Remarks**

FY 2018 and prior funding for this program was funded in PE 0603502N, Project 2131.

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Development Support Equipment | WR | NSWC, PC : PANAMA CITY, FL | 0.000 | 0.000 | | 0.000 | | 0.942 | Dec 2018 | - | | 0.942 | Continuing | Continuing | Continuing |
| Integrated Logistics Support | WR | NSWC PC : PANAMA CITY, FL | 0.000 | 0.000 | | 0.000 | | 0.111 | Nov 2018 | - | | 0.111 | Continuing | Continuing | Continuing |
| Configuration Management | WR | NSWC, PC : PANAMA CITY, FL | 0.000 | 0.000 | | 0.000 | | 0.111 | Nov 2018 | - | | 0.111 | Continuing | Continuing | Continuing |
| Studies & Analysis | WR | NSWC IH : INDIAN HEAD, MD | 0.000 | 0.000 | | 0.000 | | 0.283 | Dec 2018 | - | | 0.283 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 1.447 | | - | | 1.447 | Continuing | Continuing | N/A |

**Remarks**

FY 2018 and prior funding for this program was funded in PE 0603502N, Project 2131.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604126N / *Littoral Airborne MCM* | Project (Number/Name)<br>2131 / *Assault Breaching System* | |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Development Test & Evaluation | WR | NSWC, IH : INDIAN HEAD, MD | 0.000 | 0.000 | | 0.000 | | 1.729 | Nov 2018 | - | | 1.729 | Continuing | Continuing | Continuing |
| Operational Test & Evaluation | WR | NSWC/ IH, PC : INDIAN HEAD, PANAMA CITY | 0.000 | 0.000 | | 0.000 | | 0.555 | Dec 2018 | - | | 0.555 | Continuing | Continuing | Continuing |
| Development Test | WR | NSWC PC : Panama City, FL | 0.000 | 0.000 | | 0.000 | | 1.109 | Nov 2018 | - | | 1.109 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 3.393 | | - | | 3.393 | Continuing | Continuing | N/A |

**Remarks**

FY 2018 and prior funding for this program was funded in PE 0603502N, Project 2131.

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Contractor Engineering Support | C/CPFF | BAH, Northrop Grumman : DC, FL | 0.000 | 0.000 | | 0.000 | | 0.138 | Dec 2018 | - | | 0.138 | Continuing | Continuing | Continuing |
| Government Engineering Support | WR | NSWC, IH : INDIAN HEAD, MD | 0.000 | 0.000 | | 0.000 | | 0.501 | Nov 2018 | - | | 0.501 | Continuing | Continuing | Continuing |
| Program Management Support | WR | NSWC/ IH, PC : INDIAN HEAD, PANAMA CITY | 0.000 | 0.000 | | 0.000 | | 0.438 | Oct 2018 | - | | 0.438 | Continuing | Continuing | Continuing |
| Travel | WR | NAVSEA : WNY, DC | 0.000 | 0.000 | | 0.000 | | 0.058 | Dec 2018 | - | | 0.058 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 1.135 | | - | | 1.135 | Continuing | Continuing | N/A |

**Remarks**

FY 2018 and prior funding for this program was funded in PE 0603502N, Project 2131.

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 0.000 | | 17.622 | | - | | 17.622 | Continuing | Continuing | N/A |

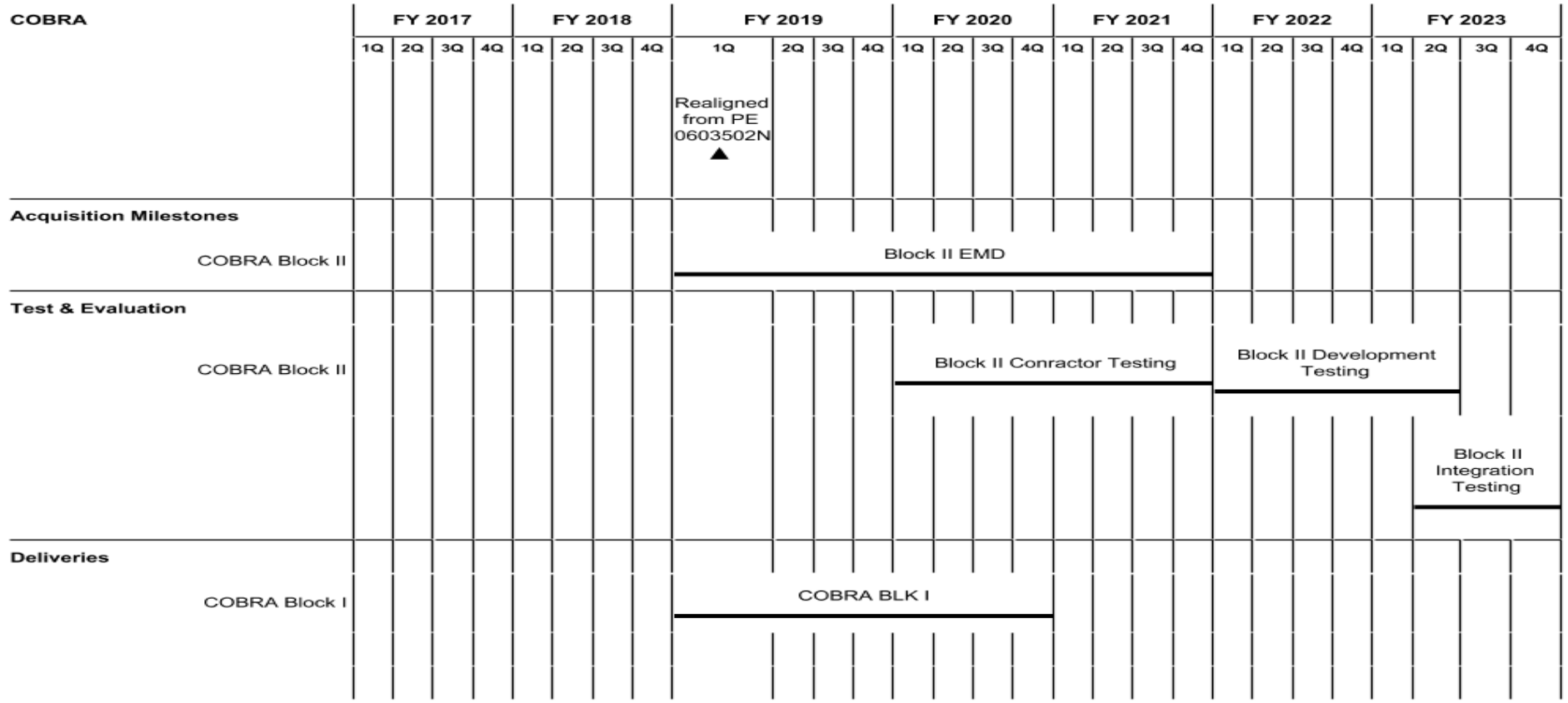
| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604126N / *Littoral Airborne MCM* | Project (Number/Name)<br>2131 / *Assault Breaching System* | |

| | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|

**Remarks**

FY 2018 and prior funding for this program was funded in PE 0603502N, Project 2131.

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604126N / *Littoral Airborne MCM* | **Project (Number/Name)**<br>2131 / *Assault Breaching System* |




*2019PB - 0604126N - 2131*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604126N / *Littoral Airborne MCM* | **Project (Number/Name)**<br>2131 / *Assault Breaching System* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***COBRA*** | | | | |
| Schedule Detail | 1 | 2019 | 1 | 2019 |
| Acquisition Milestones: COBRA Block II: COBRA Block II EMD | 1 | 2019 | 4 | 2021 |
| Test & Evaluation: COBRA Block II: COBRA Block II Contractor Testing | 1 | 2020 | 4 | 2021 |
| Test & Evaluation: COBRA Block II: COBRA Block II Development Testing | 1 | 2022 | 2 | 2023 |
| Test & Evaluation: COBRA Block II: COBRA Block II Integration Testing | 2 | 2023 | 4 | 2023 |
| Deliveries: COBRA Block I: Block I | 1 | 2019 | 4 | 2020 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0604127N *I Surface Mine Countermeasures* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 0.000 | 0.000 | 0.000 | 18.154 | - | 18.154 | 20.635 | 17.560 | 14.260 | 14.530 | Continuing | Continuing |
| 0530: *Mine Hunt Systems* | 0.000 | 0.000 | 0.000 | 7.579 | - | 7.579 | 8.861 | 7.234 | 4.447 | 4.548 | Continuing | Continuing |
| 1233: *Surface MCM Mid-life Upgrade* | 0.000 | 0.000 | 0.000 | 0.000 | - | 0.000 | 1.011 | 1.031 | 1.054 | 1.075 | Continuing | Continuing |
| 1235: *Mine Warfare Planning and Analysis* | 0.000 | 0.000 | 0.000 | 10.575 | - | 10.575 | 10.763 | 9.295 | 8.759 | 8.907 | Continuing | Continuing |

**Note**

FY 2018 and prior funding in Program Element (PE) 0603502N. Projects realigned from PE 0603502N starting in FY 2019.

The FY 2019 funding request was reduced by $1.192 million to account for the availability of prior year execution balances.

**A. Mission Description and Budget Item Justification**

This program element provides resources in support of development of mine countermeasure systems to provide minehunting, minesweeping, and neutralization to counter known and projected mine threats. The mine countermeasures systems provide mobile, quick reaction forces capable of land or sea-based minehunting and minesweeping operations worldwide. Resources are for developing and deploying advanced mine-hunting and minesweeping systems and the intelligence and oceanographic capabilities that will enable mine warfare superiority. Tactics and techniques used vary across a diversity of environments and a diversity of threats, including both asymmetric and emerging. Resources provide for systems and support of mine warfare systems, maritime systems, and expeditionary systems to allow for continuous operations of the Navy's warships and support vessels, other military vessels, and commercial vessels. Increased capability includes conducting minefield reconnaissance (mine density and location) at high area search rates, improving detection capability, decreasing sensor false alarm rates, reducing or eliminating post-mission analysis detect, classify, identify, decide time, improving neutralization time, improving network communications, automatic target recognition, and achieving in-stride detect-to-engage capability. The Surface Mine Countermeasures programs are in general platform independent and will provide detection, classification, localization, identification, neutralization, and influence clearance capabilities. Programs develop: (1) Unmanned minehunting capability for surface platforms; (2) the integration and improvement of new and existing systems (3) support for systems which detect, localize, classify, identify, and neutralize all mine types across MCM Avenger Class and other platforms.

1)The AN/AQS-20 is a mine hunting and identification system with sensors housed in an underwater towed body. The sensors are designated for the detection, classification and localization of bottom, close-tethered, and volume targets, and also for the identification of bottom targets. The system will be deployed from the Littoral Combat Ship (LCS) as part of the MCM Mission Package or can be deployed from other Vessels of Opportunity (VOO). The MCM USV is the tow platform for the AN/AQS-20.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0604127N *I Surface Mine Countermeasures* |

2) AN/SQQ-32(V)4 High-Frequency, Wide Band (HFWB) is a technology upgrade to the AN/SQQ-32 Towed Body which will incorporate HFWB technology into the detection sonar to address performance deficiencies against new mine threats in the littorals. This upgrade will be installed on MCM-1 Class ships with the AN/SQQ-32(V)3 and will develop new transducer modules, fiber optic cable and modify topside processing and display software.
3) Mine Warfare and Environmental Decision Aids Library (MEDAL) is a software segment on the Global Command and Control System - Maritime (GCCS-M). MEDAL provides mine and mine warfare planning and evaluation tools and databases to the MCM Commander. 3) Develop and implement Mine Countermeasures Commander's Estimate of the Situation (MCM CES).
4) AN/SLQ-60 Mine Neutralization System (MNS) Seafox on the MCM Class ships. MNS is the replacement to the existing AN/SLQ-48 Mine Neutralization System.
5) SSQ-94 MCM Trainer upgrade will incorporate the AN/SQQ-32 (V)4 sonar, SSN2(V)5 PINS and Mine Neutralization System Team Trainer.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 0.000 | 0.000 | 0.000 | - | 0.000 |
| Current President's Budget | 0.000 | 0.000 | 18.154 | - | 18.154 |
| Total Adjustments | 0.000 | 0.000 | 18.154 | - | 18.154 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | - | - | | | |
| • Rate/Misc Adjustments | 0.000 | 0.000 | 18.154 | - | 18.154 |

**Change Summary Explanation**

Program Changes:
FY19 +$18,154K realigned from PE 0603502N in FY 2019.

Technical: Not applicable.
Schedule: Not applicable.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604127N / *Surface Mine Countermeasures* | Project (Number/Name)<br>0530 / *Mine Hunt Systems* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0530: *Mine Hunt Systems* | 0.000 | 0.000 | 0.000 | 7.579 | - | 7.579 | 8.861 | 7.234 | 4.447 | 4.548 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

FY 2018 and prior funding in Program Element (PE) 0603502N. Projects moved from PE 0603502N starting in FY 2019.

The FY 2019 funding request was reduced by $1.192 million to account for the availability of prior year execution balances.

**A. Mission Description and Budget Item Justification**

This project contains resources for systems, subsystems, and sensors integrated for use with the new program MCM Unmanned Surface Vehicle (MCM USV) for mine detection, classification, localization, and identification in support of mine neutralization, and influence clearance capabilities. Research, development, test, and evaluation efforts are for increasing capability by decreasing time required to conduct Mine Countermeasures (MCM) operations, ensuring low risk to naval and commercial vessels, and removing the man from the minefield. Increased capability includes conducting minefield reconnaissance (mine density and location) at high area search rates, improving detection capability, decreasing sensor false alarm rates, and reducing post-mission analysis for detection, classification, and identification.

The AN/AQS-20 is a mine hunting and identification system with sensors housed in an underwater towed body. The sensors are designated for the detection, classification and localization of bottom, close-tethered, and volume targets, and also for the identification of bottom targets. The system will be deployed from the Littoral Combat Ship (LCS) as part of the MCM Mission Package or can be deployed from other Vessels of Opportunity (VOO). The MCM USV is the tow platform for the AN/AQS-20. The AN/AQS-20 Block 1 (the AQS-20A) is undergoing a Pre-Planned Product Improvement (P3I) program to upgrade the Forward Looking Sonar (FLS) and Side-Looking Sonars (SLS) to improve Probability of Classifying a Mine-like object as a Mine, reduce False Classification, and improve Depth Localization performance to meet Block 2 (the AQS-20C) performance. The Forward Looking Sonar is being replaced with a new High Frequency Wideband Forward Looking Sonar (WBFLS) design. The SLS is being replaced with a new Multifunction SLS with Synthetic Aperture Sonar (SAS) capability, as well as, improved signal processing and Signal to Noise Ratio. The Block 1 P3I program began in FY 2012 and completed in FY 2017. Award and management for Block 2 production units began in FY 2014 (the AQS-20C). Materiel Reliability, obsolescence, and performance Engineering Change Proposal (ECP) efforts continue beyond FY2023.

In FY 2018, the AN/AQS-20 Block 2 program (AQS-20C) is scheduled to conduct Developmental Testing (originally scheduled to start at end of FY17), initiate MCM USV integration, and initiation of MCM improvements for post mission analysis tools in support of Net-centric Sensor Analysis for Mine Warfare (NSAM) integration for the Fleet Operators. The net effect of these tools combined with the more powerful AN/AQS-20 Block 2 sensors will be improved classification of mines, more accurate vertical localization, reduced false calls, and improved area clearance rate sustained. Improvements also include the collection and ingestion of in-situ environmental data used for mission planning to configure the sensor which optimizes sensor performance during missions. Development of these tools begins in FY 2018 and will continue through FY 2021.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604127N / *Surface Mine Countermeasures* | **Project (Number/Name)**<br>0530 / *Mine Hunt Systems* |

In FY 2019, the AN/AQS-20 Block 2 program will support the MCM USV User Operational Evaluation System (UOES), MCM USV Development Testing, and workups for the LCS MP Testing. NSAM initial integration efforts will continue. SAS acoustic mine recognition development will continue to support the potential for automated in-situ mine identification. Also efforts will include defining and developing necessary improvements for AN/AQS-20 Block 2 integration with the MCM USV.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** AN/AQS-20 Product Development | 0.000 | 0.000 | 3.000 | 0.000 | 3.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY 2018 funding in Program Element (PE) 0603502N. | | | | | |
| ***FY 2019 Base Plans:***<br>- Continue SAS Acoustic mine recognition development.<br>- Continue SAS Acoustic mine recognition ECP.<br>- Continue algorithm development for AN/AQS-20 Block 2 PMA Improvements including NSAM integration.<br>- Continue AN/AQS-20 Block 2 improvements in support of MCM USV integration.<br>- Correct deficiencies identified during testing. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2018 funding in Program Element (PE) 0603502N. FY 2019 slight decrease due to completion of PMA Software efforts. | | | | | |
| ***Title:*** AN/AQS-20 Support | 0.000 | 0.000 | 0.900 | 0.000 | 0.900 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY 2018 funding in Program Element (PE) 0603502N. | | | | | |
| ***FY 2019 Base Plans:***<br>- Provide ongoing technical and management support to AN/AQS-20.<br>- Continue to conduct test minefield maintenance.<br>- Continue AN/AQS-20 Block 2 Mission Planning and Post Mission Analysis Concept of Employment development. | | | | | |
| ***FY 2019 OCO Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604127N / *Surface Mine Countermeasures* | **Project (Number/Name)**<br>0530 / *Mine Hunt Systems* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2018 funding in Program Element (PE) 0603502N. No significant change from FY 2018 to FY 2019. | | | | | |
| ***Title:*** AN/AQS-20 Test and Evaluation | 0.000 | 0.000 | 3.179 | 0.000 | 3.179 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY 2018 funding in Program Element (PE) 0603502N.<br><br>***FY 2019 Base Plans:***<br>- Continue SAS Acoustic recognition Testing.<br>- Update Test and Evaluation Master Plan.<br>- Support MCM USV User Operational Evaluation System.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2018 funding in Program Element (PE) 0603502N. FY 2019 decrease due to completion of Developmental Testing (DT) in FY 2018. | | | | | |
| ***Title:*** AN/AQS-20 Management Services | 0.000 | 0.000 | 0.500 | 0.000 | 0.500 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY 2018 funding in Program Element (PE) 0603502N.<br><br>***FY 2019 Base Plans:***<br>- Provide planning and management for the AN/AQS-20 program.<br>- Begin update of acquisition documentation in support of Full Rate Production (FRP) Decision Review.<br>- Continue to provide Program Office travel support.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604127N / *Surface Mine Countermeasures* | **Project (Number/Name)**<br>0530 / *Mine Hunt Systems* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| FY 2018 funding in Program Element (PE) 0603502N. No significant change from FY 2018 to FY 2019. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 0.000 | 7.579 | 0.000 | 7.579 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • OPN/1601: *LCS MCM Mission Modules* | 29.724 | 55.870 | 124.147 | - | 124.147 | 204.324 | 245.108 | 227.068 | 234.109 | 1,501.531 | 2,771.262 |
| • RDTEN/0603502N/0530: *Mine Hunt Systems* | 9.469 | 9.761 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 299.669 |

**Remarks**

OPN/1601 funding line accounts for several programs, of which the AN/AQS-20 program is only a portion.

**D. Acquisition Strategy**

AN/AQS-20 LRIP procurement continued following Block 2 (AQS-20C units) competitive contract award in FY 2014. Continue to meet MCM MP requirements to support production of Block 2 units.

**E. Performance Metrics**

AN/AQS-20 - Successfully complete Block 2 DT in FY 2018.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604127N / *Surface Mine Countermeasures* | Project (Number/Name)<br>0530 / *Mine Hunt Systems* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AN/AQS-20 P3I | C/CPFF | Raytheon : Portsmouth, RI | 0.000 | 0.000 | | 0.000 | | 1.100 | Nov 2018 | - | | 1.100 | Continuing | Continuing | Continuing |
| AN/AQS-20 P3I | C/CPFF | ARL/UT : Austin, TX | 0.000 | 0.000 | | 0.000 | | 0.250 | Nov 2018 | - | | 0.250 | Continuing | Continuing | Continuing |
| AN/AQS-20 Block 2 PMA | WR | NSWC, PC : Panama City FL | 0.000 | 0.000 | | 0.000 | | 0.800 | Oct 2018 | - | | 0.800 | Continuing | Continuing | Continuing |
| AN/AQS-20 Block 2 PMA | C/CPFF | ARL/UT : Austin, TX | 0.000 | 0.000 | | 0.000 | | 0.850 | Nov 2018 | - | | 0.850 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 3.000 | | - | | 3.000 | Continuing | Continuing | N/A |

**Remarks**

FY 2018 and prior funding in Program Element (PE) 0603502N.

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AN/AQS-20 Engineering Services | WR | NSWC, PC : Panama City, FL | 0.000 | 0.000 | | 0.000 | | 0.135 | Oct 2018 | - | | 0.135 | Continuing | Continuing | Continuing |
| AN/AQS-20 Engineering Services | C/CPFF | Raytheon : Portsmouth, RI | 0.000 | 0.000 | | 0.000 | | 0.200 | Nov 2018 | - | | 0.200 | Continuing | Continuing | Continuing |
| AN/AQS-20 ILS Function | WR | NSWC, PC : Panama City FL | 0.000 | 0.000 | | 0.000 | | 0.565 | Nov 2018 | - | | 0.565 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 0.900 | | - | | 0.900 | Continuing | Continuing | N/A |

**Remarks**

FY 2018 and prior funding in Program Element (PE) 0603502N.

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AN/AQS-20 T&E Functions | WR | COTF : Norfolk, VA | 0.000 | 0.000 | | 0.000 | | 0.200 | Nov 2018 | - | | 0.200 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604127N / *Surface Mine Countermeasures* | **Project (Number/Name)**<br>0530 / *Mine Hunt Systems* |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AN/AQS-20 T&E Functions | WR | NSWC, PC : Panama City FL | 0.000 | 0.000 | | 0.000 | | 2.479 | Oct 2018 | - | | 2.479 | Continuing | Continuing | Continuing |
| AN/AQS-20 T&E Functions | C/CPFF | Raytheon : Portsmouth, RI | 0.000 | 0.000 | | 0.000 | | 0.500 | Nov 2018 | - | | 0.500 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 3.179 | | - | | 3.179 | Continuing | Continuing | N/A |

**Remarks**

FY 2018 and prior funding in Program Element (PE) 0603502N.

COTF - Naval Command Operational Test and Evaluation Force

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AN/AQS-20 Management Services | TBD | Various : Various | 0.000 | 0.000 | | 0.000 | | 0.470 | Dec 2018 | - | | 0.470 | Continuing | Continuing | Continuing |
| AN/AQS-20 Travel | TBD | Various : Various | 0.000 | 0.000 | | 0.000 | | 0.030 | Mar 2019 | - | | 0.030 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 0.500 | | - | | 0.500 | Continuing | Continuing | N/A |

**Remarks**

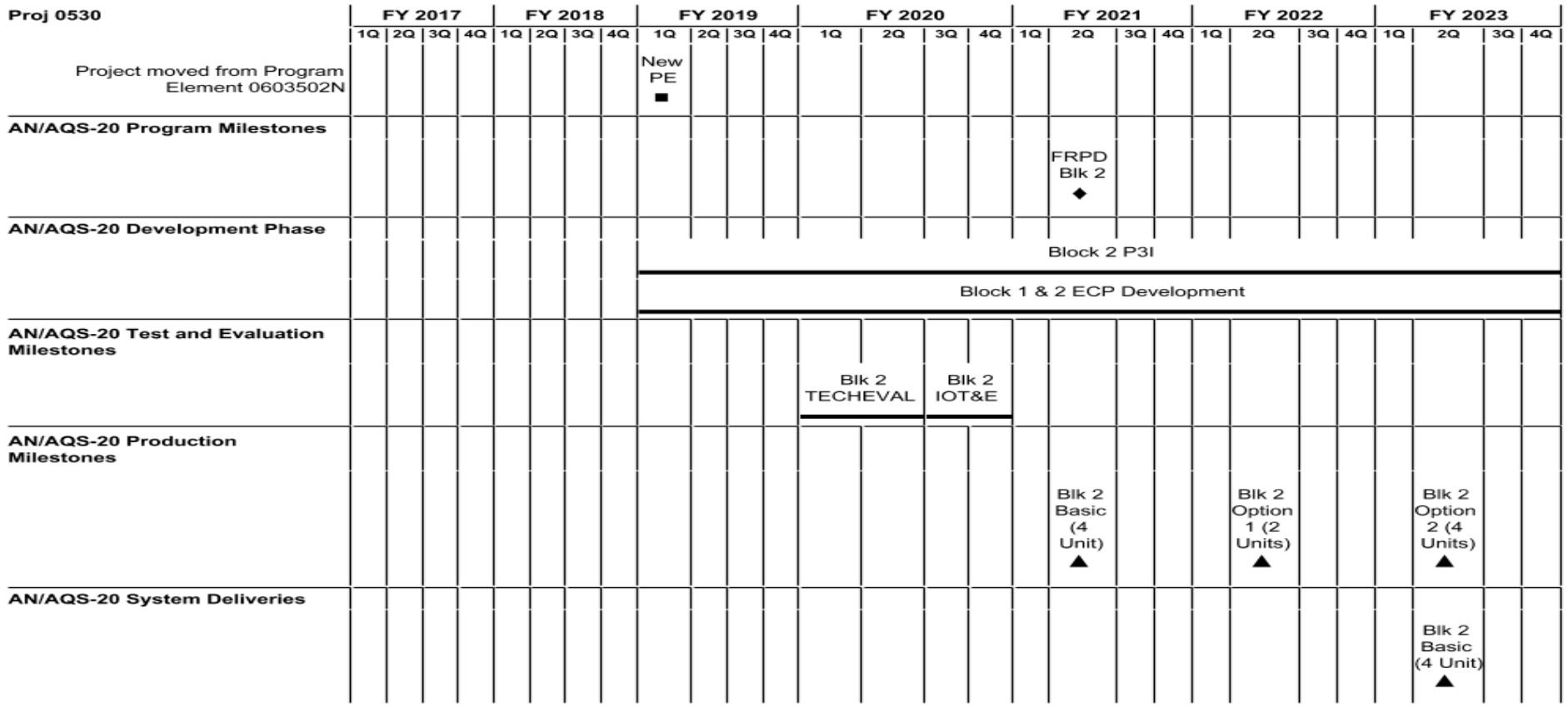
FY 2018 and prior funding in Program Element (PE) 0603502N.

| | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 0.000 | | 7.579 | | - | | 7.579 | Continuing | Continuing | N/A |

**Remarks**

FY 2018 and prior funding in Program Element (PE) 0603502N.

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604127N / *Surface Mine Countermeasures* | **Project (Number/Name)**<br>0530 / *Mine Hunt Systems* |




*2019PB - 0604127N - 0530*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604127N / *Surface Mine Countermeasures* | **Project (Number/Name)**<br>0530 / *Mine Hunt Systems* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 0530*** | | | | |
| Project moved from Program Element 0603502N: New PE | 1 | 2019 | 1 | 2019 |
| AN/AQS-20 Program Milestones: AN/AQS-20 Full Rate Production (FRP) Decision Block 2 | 2 | 2021 | 2 | 2021 |
| AN/AQS-20 Development Phase: AN/AQS-20 Block 2 P3I | 1 | 2019 | 4 | 2023 |
| AN/AQS-20 Development Phase: AN/AQS-20 Materiel Reliability, Obsolesence, and Performance ECP Development (Block 1 & 2) | 1 | 2019 | 4 | 2023 |
| AN/AQS-20 Test and Evaluation Milestones: AN/AQS-20 Test Events Block 2 IOT&E | 3 | 2020 | 4 | 2020 |
| AN/AQS-20 Test and Evaluation Milestones: AN/AQS-20 Test Events Block 2 TECHEVAL | 1 | 2020 | 2 | 2020 |
| AN/AQS-20 Production Milestones: AN/AQS-20 Block 2 New Basic Award (4 Unit) | 2 | 2021 | 2 | 2021 |
| AN/AQS-20 Production Milestones: AN/AQS-20 Block 2 Option 1 Award (2 Units) | 2 | 2022 | 2 | 2022 |
| AN/AQS-20 Production Milestones: AN/AQS-20 Block 2 Option 2 Award (4 Units) | 2 | 2023 | 2 | 2023 |
| AN/AQS-20 System Deliveries: AN/AQS-20 Block 2 New Basic Award Systems (4 Unit) | 2 | 2023 | 2 | 2023 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604127N / *Surface Mine Countermeasures* | Project (Number/Name)<br>1233 / *Surface MCM Mid-life Upgrade* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1233: *Surface MCM Mid-life Upgrade* | 0.000 | 0.000 | 0.000 | 0.000 | - | 0.000 | 1.011 | 1.031 | 1.054 | 1.075 | Continuing | Continuing |
| Quantity of RDT&E Articles | - | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

This project provides resources for development, improvement and integration of MCM systems. A description of the major planned programs include the following:

1) AN/SQQ-32(V)4 High-Frequency, Wide Band (HFWB) is a technology upgrade to the AN/SQQ-32 Towed Body which will incorporate HFWB technology into the detection sonar to address performance deficiencies against new mine threats in the littorals. This upgrade will be installed on MCM-1 Class ships with the AN/SQQ-32(V)3 and will develop new transducer modules, fiber optic cable and modify topside processing and display software. 2) Mine Warfare and Environmental Decision Aids Library (MEDAL) is a software segment on the Global Command and Control System - Maritime (GCCS-M). MEDAL provides mine and mine warfare planning and evaluation tools and databases to the MCM Commander. 3) Develop and implement Mine Countermeasures Commander's Estimate of the Situation (MCM CES). 4) The Unmanned Influence Sweep System (UISS) utilizes an Unmanned Surface Vehicle (USV) integrated with an Unmanned Surface Sweep System (US3), a magnetic/acoustic sweep system developed to sweep acoustic/magnetic influence mines, which can be deployed from the Littoral Combat Ship (LCS) or a ship of opportunity; 5) The Multi-Function USV replaces the sweep system with a minehunting sensor. The capability leverages off a common USV to conduct minehunting missions. 6) AN/SLQ-60 Mine Neutralization System (MNS) Seafox on the MCM Class ships. MNS is the replacement to the existing AN/SLQ-48 Mine Neutralization System. 7) SSQ-94 MCM Trainer upgrade will incorporate the AN/SQQ-32 (V)4 sonar, SSN2(V)5 PINS and Mine Neutralization System Team Trainer.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604127N / *Surface Mine Countermeasures* | Project (Number/Name)<br>1235 / *Mine Warfare Planning and Analysis* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1235: *Mine Warfare Planning and Analysis* | 0.000 | 0.000 | 0.000 | 10.575 | - | 10.575 | 10.763 | 9.295 | 8.759 | 8.907 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

FY 2018 and prior funding in Program Element (PE) 0603502N. Projects realigned from PE 0603502N starting in FY 2019.

**A. Mission Description and Budget Item Justification**

Mine Warfare and Environmental Decision Aids Library (MEDAL) is a software segment on the Global Command and Control System - Maritime (GCCS-M). MEDAL provides mine and mine warfare planning and evaluation tools and databases to the MCM Commander.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** MEDAL Product Development | 0.000 | 0.000 | 5.648 | 0.000 | 5.648 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY 2018 funding for this program was funded in PE 0603502N, Project 1235. | | | | | |
| ***FY 2019 Base Plans:***<br>FY19 funding will initiate development of the MIW IST. This MIW Integrated Synthetic Trainer is the means in which to conduct Integrated Phase training for MIW forces similar to a Fleet Synthetic Training (FST) event for a CSG/ESG. This tool will provide the capability to train the U.S. Navy's four MIW staffs that include one Theater MIWC and three MCMCs against near peer threats. MIW IST will be a separate tool that executes in conjunction with the MEDAL mission planning and evaluation system used by MIW staffs and units. It will incorporate the laydown of simulated threat minefields expected to be used to blockade ports, defend against landing assaults, or deny access to sea lines of communication and to control the training event. It will use MIW staff created MEDAL MCM plans, underlying MIW databases, and real world environmental databases to generate simulated mission sorties and interactions with the defined minefields. These generated mission files will allow staffs to use MEDAL to evaluate each days progress determining achieved clearance and remaining risk to ship traffic. MIW IST will have an adjustable "Game Clock" allowing staffs in faster than real time to conduct multi-week long MCM operations in a classroom environment. FY19 work will initially focus on defining user requirements, software design, and transition to an Agile Software development process. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604127N / *Surface Mine Countermeasures* | **Project (Number/Name)**<br>1235 / *Mine Warfare Planning and Analysis* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| FY19 funding will also support the MINEnet Tactical development to enhance the Minefield Planning capabilities, support interface changes, and provide updates to sortie planning and databases for the transition of AQS-20A to the AQS-20C configuration. The MEDAL EA course curriculum for MINEnet Tactical 1.3 will be updated and updated software will be fielded to the Mine Warfare Training Center. Work will also begin on MINEnet Tactical v1.4, which will provide the replacement of all commercial-off-the-shelf (COTS) components, which are either near end-of-life or no longer approved in Department of the Navy (DoN) Application and Database Management System (DADMS). Update application as required to support new and approved COTS components. FY19 work will also complete cybersecurity transition from DIACAP to Risk Management Framework (RMF).<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Funding was realigned from PE 0603502N, Project 1235. Increase in FY 2019 funding supports the development of the Mine Warfare (MIW) Integrated Synthetic Trainer (IST) and MINEnet Tactical v1.4. | | | | | |
| ***Title:*** MEDAL Support | 0.000 | 0.000 | 3.187 | 0.000 | 3.187 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY 2018 funding for this program was funded in PE 0603502N, Project 1235.<br>***FY 2019 Base Plans:***<br>Complete the development of MEDAL EA MINEnet Tactical v1.3 capability and Planning on Risk (PoR). Provide technical integration of developed algorithms and models that have demonstrated effectiveness with respect to objective requirements. Additionally, fielding work will increase and the initial roll out of MINEnet Tactical to the fleet will continue; ramping up the fielding efforts will allow retirement of older MEDAL Build 11 by end of FY19. The support will address fixing software defects and high-priority fleet change requests reported in MINEnet Tactical v1.2.2 and release the upgrades in the MINEnet Tactical v1.3 development baseline. Finally, the support effort will include communication with activities such as applied labs, government activities, and designated contractors. Assist in providing the speed, agility, adaptability, and flexibility required for modern MCM operations.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604127N / *Surface Mine Countermeasures* | **Project (Number/Name)**<br>1235 / *Mine Warfare Planning and Analysis* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Funding was realigned from PE 0603502N, Project 1235. Increase in FY 2019 funding supports completing the development of MINEnet Tactical and the ramp up of fielding to the Fleet. | | | | | |
| ***Title:*** MEDAL Test and Evaluation | 0.000 | 0.000 | 0.825 | 0.000 | 0.825 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY 2018 funding for this program was funded in PE 0603502N, Project 1235. | | | | | |
| ***FY 2019 Base Plans:***<br>Continue System Development testing activities with multiple platforms including LCS MCM MPAS, ISNS, CANES and ONENET integration tests. Continue Cybersecurity patching and assessments. Deliver to Fleet in accordance with the MEDAL EA Fielding Plan. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Funding was realigned from PE 0603502N, Project 1235. Increase in FY 2019 funding supports required testing. | | | | | |
| ***Title:*** MEDAL Management | 0.000 | 0.000 | 0.915 | 0.000 | 0.915 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY 2018 funding for this program was funded in PE 0603502N, Project 1235. | | | | | |
| ***FY 2019 Base Plans:***<br>Continue to provide program management support and travel for MEDAL program. Program management shall include overall technical guidance and leadership for the program. Oversight of financial and logistics efforts and coordination with Navy and other DoD organizations and contractors as required to ensure successful execution of the program. As part of the systems engineering element of PM, communicate and coordinate with MIW C4ISR, ICWS, Organic MCM, Mainstreaming MIEW, Expeditionary Warfare C4ISR, tactics development, long term planning, Naval Special Clearance Team (NSCT-1) Assault Breaching System (ABS), LCS, and other programs as they relate to MEDAL and MIW Mission Planning, Evaluation, and C4ISR. Other PM tasking to include briefings, demonstrations, and project planning as required. | | | | | |
| ***FY 2019 OCO Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604127N / *Surface Mine Countermeasures* | **Project (Number/Name)**<br>1235 / *Mine Warfare Planning and Analysis* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Funding was realigned from PE 0603502N, Project 1235. Increase in FY 2019 funding supports required management support. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 0.000 | 10.575 | 0.000 | 10.575 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • 2622/LV075: *Mine Sweeping Replacement (MEDAL).* | 2.358 | 3.585 | 1.111 | - | 1.111 | 0.799 | 0.889 | 0.891 | 0.900 | 0.000 | 16.356 |

**Remarks**

**D. Acquisition Strategy**

Mine Warfare and Environmental Decision Aids Library (MEDAL) - requirements for MEDAL Builds are generated through a formal requirements process. Requirements conferences gather a list of candidate functions based on a logical sequence to fully implement the overall software architecture. The fleet is presented with a recommended list of candidate capabilities based on this program plan, doctrine, fleet comments, and technology. These capability items are then prioritized by the fleet representatives (coordinated by Naval Surface and Mine War-fighting Development Center (SMWDC). The fleet inputs are then consolidated by COMINEWARCOM into an overall list which is then presented to Navy leadership for pricing and final selection. The selection is based on price, risk, available funding, and possibly by other program factors (e.g., ensure that MEDAL supports other program delivery schedules). Selection balances immediate needs, long term objectives, technical maturity and other programmatic factors. A verification and validation process is applied to any algorithms, tactics, or models to be incorporated in the software.

**E. Performance Metrics**

Mine Warfare and Environmental Decision Aids Library (MEDAL) development to include integration of data fusion techniques and incorporation of Data Access Layer (DAL) architecture to meet FORCEnet requirements.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604127N / *Surface Mine Countermeasures* | **Project (Number/Name)**<br>1235 / *Mine Warfare Planning and Analysis* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MEDAL EA | C/CPAF | SAIC : McLean, VA | 0.000 | 0.000 | | 0.000 | | 5.648 | Oct 2018 | - | | 5.648 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 5.648 | | - | | 5.648 | Continuing | Continuing | N/A |

**Remarks**

FY 2018 and prior funding in Program Element (PE) 0603502N.

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MEDAL EA | WR | NSWC PC : Panama City FL | 0.000 | 0.000 | | 0.000 | | 3.187 | Nov 2018 | - | | 3.187 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 3.187 | | - | | 3.187 | Continuing | Continuing | N/A |

**Remarks**

FY 2018 and prior funding in Program Element (PE) 0603502N.

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MEDAL EA | C/CPAF | SAIC : McLean, VA | 0.000 | 0.000 | | 0.000 | | 0.825 | Oct 2018 | - | | 0.825 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 0.825 | | - | | 0.825 | Continuing | Continuing | N/A |

**Remarks**

FY 2018 and prior funding in Program Element (PE) 0603502N.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604127N / *Surface Mine Countermeasures* | Project (Number/Name)<br>1235 / *Mine Warfare Planning and Analysis* | |

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MEDAL EA | WR | NSWC PC : Panama City Fl | 0.000 | 0.000 | | 0.000 | | 0.915 | Nov 2018 | - | | 0.915 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 0.915 | | - | | 0.915 | Continuing | Continuing | N/A |

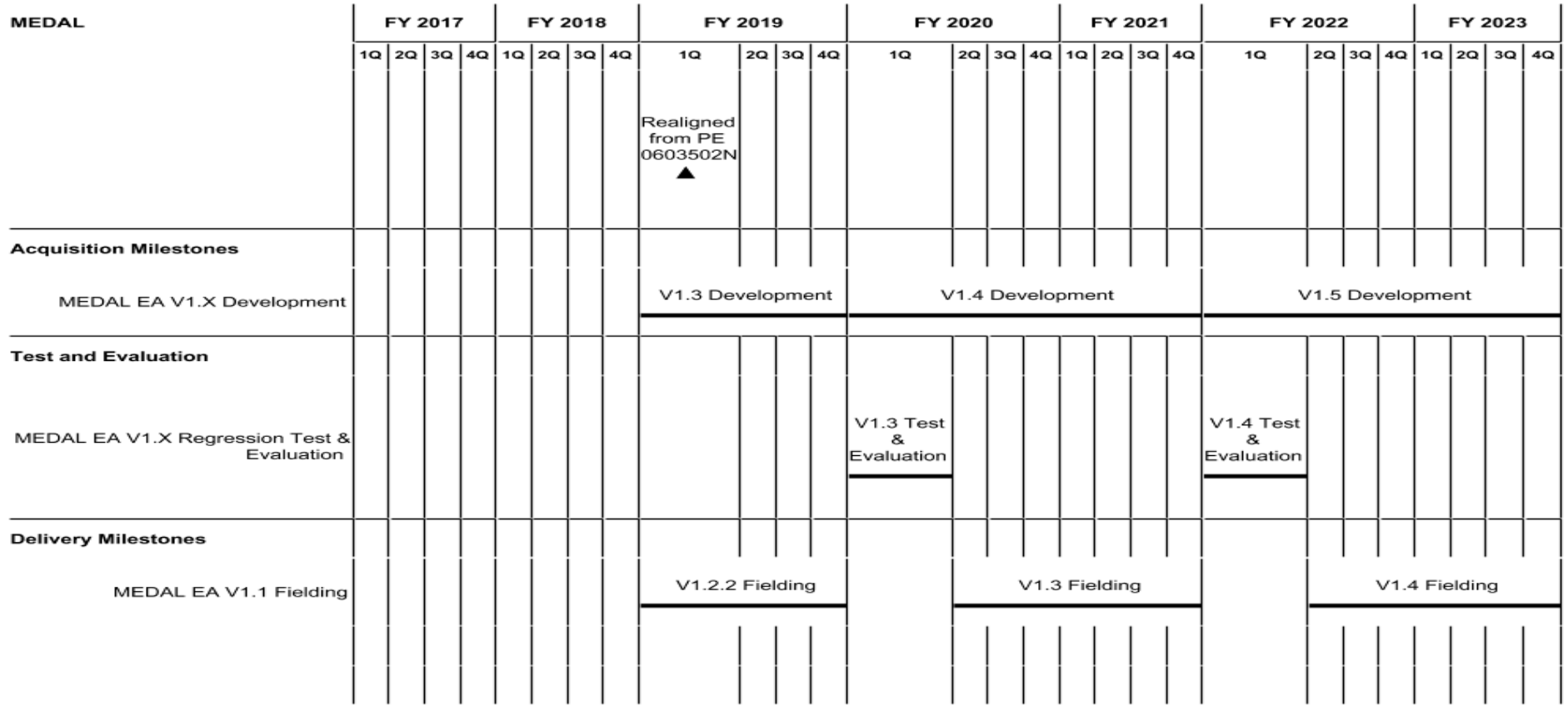
**Remarks**

FY 2018 and prior funding in Program Element (PE) 0603502N.

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 0.000 | | 10.575 | | - | | 10.575 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604127N / *Surface Mine Countermeasures* | **Project (Number/Name)**<br>1235 / *Mine Warfare Planning and Analysis* |




*2019PB - 0604127N - 1235*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604127N / *Surface Mine Countermeasures* | **Project (Number/Name)**<br>1235 / *Mine Warfare Planning and Analysis* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***MEDAL*** | | | | |
| Schedule Detail | 1 | 2019 | 1 | 2019 |
| Acquisition Milestones: MEDAL EA V1.X Development: MEDAL EA V1.3X Development | 1 | 2019 | 4 | 2019 |
| Acquisition Milestones: MEDAL EA V1.X Development: MEDAL EA V1.4X Development | 1 | 2020 | 4 | 2021 |
| Acquisition Milestones: MEDAL EA V1.X Development: MEDAL EA V1.5X Development | 1 | 2022 | 4 | 2023 |
| Test and Evaluation: MEDAL EA V1.X Regression Test & Evaluation: MEDAL EA V1.3X Test & Evaluation | 1 | 2020 | 1 | 2020 |
| Test and Evaluation: MEDAL EA V1.X Regression Test & Evaluation: MEDAL EA V1.34 Test & Evaluation | 1 | 2022 | 1 | 2022 |
| Delivery Milestones: MEDAL EA V1.1 Fielding: MEDAL EA V1.2 Fielding | 1 | 2019 | 4 | 2019 |
| Delivery Milestones: MEDAL EA V1.1 Fielding: MEDAL EA V1.3 Fielding | 2 | 2020 | 4 | 2021 |
| Delivery Milestones: MEDAL EA V1.1 Fielding: MEDAL EA V1.4 Fielding | 2 | 2022 | 4 | 2023 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0604272N *I Tact Air Dir Infrared CM (TADIRCM)* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 31.940 | 59.753 | 52.554 | 47.278 | - | 47.278 | 48.907 | 51.979 | 35.605 | 36.409 | Continuing | Continuing |
| 3304: *CIRCM* | 31.940 | 59.753 | 5.965 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 223.938 | 321.596 |
| 3348: *DAIRCM Development* | 0.000 | 0.000 | 46.589 | 47.278 | - | 47.278 | 48.907 | 51.979 | 35.605 | 36.409 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

This element includes development of electronic warfare systems for the United States Navy (USN) and United States Marine Corps (USMC) assault aircraft. This includes the development and testing of advanced infrared countermeasures systems for emerging threats and emergency contingencies for Aircraft Survivability Equipment (ASE) suite integration.

FY 2017 Research Development Test and Evaluation (RDT&E) funding is required for a federated Distributed Aperture Infrared Countermeasure (DAIRCM) system in support of Joint Urgent Operational Need Statement (JUONS) S0-0010. Funding covers developmental activities in hardware and software to reduce the size, weight, and power required to achieve a threat (missile, LASER and Hostile Fire) warning detection and defeat system compatible with mission planning information that stores sensor data for post mission threat analysis.

FY 2018 RDT&E overseas contingency operations (OCO) funding is required to finalize testing in support of fielding the federated DAIRCM JUONS system. In addition, DAIRCM Program of Record risk reduction efforts will be funded.

FY 2019 RDT&E funding required for an integrated (under glass) DAIRCM solution on AH-1Z, UH-1Y and MH-60S/R platforms via an Engineering Change Proposal (ECP). Program of Record will eventually support integration and retrofit of 300 USMC and 397 USN aircraft.

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under ADVANCED COMPONENT DEVELOPMENT AND PROTOTYPES because it includes all efforts necessary to evaluate integrated technologies, representative models or prototype systems in a high fidelity and realistic operating environment.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | Date: February 2018 |
|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | R-1 Program Element (Number/Name)<br>PE 0604272N *I Tact Air Dir Infrared CM (TADIRCM)* | | | |
| **B. Program Change Summary ($ in Millions)** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** |
| Previous President's Budget | 34.920 | 46.844 | 47.991 | - | 47.991 |
| Current President's Budget | 59.753 | 52.554 | 47.278 | - | 47.278 |
| Total Adjustments | 24.833 | 5.710 | -0.713 | - | -0.713 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | -3.265 | 0.000 | | | |
| • SBIR/STTR Transfer | -1.892 | 0.000 | | | |
| • Program Adjustments | 37.990 | 5.710 | 0.000 | - | 0.000 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -0.713 | - | -0.713 |
| • Congressional Directed Reductions Adjustments | -8.000 | - | - | - | - |

**Change Summary Explanation**

The JUONS schedule slid right due to hardware (HW) Electromagnetic Interference (EMI) exceedances found during early testing. The exceedances drove HW modifications that delayed the schedule but identified issues early enough to minimize the impact. The schedule has also been driven by platform integration issues associated with multiple Enhanced GPS/INS units and software transferring/timing issues from older, slower processing chips to more advanced chipsets.

-JUONS Fielding changed ending quarter from 3 Qtr 2018 to 2 Qtr 2019
-JUONS A Kit Development added
-JUONS A Kit Installation Test Aircraft changed end date from 4Q17 to 3Q18
-JUONS TRR changed from 4Q17 to 1Q19
-JUONS Fleet Feedback Software Load changed from 1Q19-2Q19 to 3Q19-4Q23
-JUONS Live Fire Test 1 changed from 1Q17 to 4Q18
-JUONS Integrated Test 1 changed from 4Q17 to 3Q18
-JUONS Integrated Test 2 changed from 1Q18 to 4Q18
-JUONS Live Fire Test 2 changed from 2Q18 to 1Q19
-JUONS Quick Reaction Assessment changed from 2Q18 to 1Q19
-JUONS Test Assets Deliveries added

DAIRCM slid right due to delayed approval of Program of Record.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0604272N *I Tact Air Dir Infrared CM (TADIRCM)* |

-DAIRCM SRR changed from 3Q17 to 3Q19
-DAIRCM SFR Added
-DAIRCM PDR changed from 3Q18 to 1Q20
-DAIRCM CDR from 1Q19 to 3Q20
-DAIRCM Software Qualification Test from 1Q19 to 4Q21
-DAIRCM B-Kit Integration end date extended from 2nd Qtr 2019 to 2nd Qtr 2021
-DAIRCM TRR changed from 2Q19 to 1Q21
-DAIRCM Integrated Test & Evaluation changed from 3Q19 - 1Q22 to 1Q22 - 2Q22
-DAIRCM Live Fire Test 3-5 removed
-DAIRCM Operation Assessment Added
-DAIRCM ECP Contract Award changed from 2nd Qtr 2018 to 3rd Qtr 2019
-DAIRCM SW Val/Ver changed from 1Q19 to 4Q21

The FY 2019 funding request was reduced by $0.449M to reflect the Department of Navy's effort to support the Office of Management and Budget directed reforms for Efficiency and Effectiveness that include a lean, accountable, more efficient government.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604272N / *Tact Air Dir Infrared CM (TADIRCM)* | Project (Number/Name)<br>3304 / *CIRCM* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3304: *CIRCM* | 31.940 | 59.753 | 5.965 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 223.938 | 321.596 |
| Quantity of RDT&E Articles | | 5 | - | - | - | - | - | - | - | - | | |

**Note**

Cost to Complete should be ZERO. Total Cost should be 97.658. CIRCM Funds for FY19 through FY23 are realigned to DAIRCM PU 3348.

**A. Mission Description and Budget Item Justification**

Common Infrared Countermeasures (CIRCM) was a new start for the Navy in FY 2013. This project includes the development, integration, and testing of a laser-based directed infrared countermeasure system for United States Navy and United States Marine Corps assault aircraft. This infrared countermeasure, when integrated with a threat warning detection system, will be capable of countering current and emerging infrared threats. An Under Secretary of Defense for Acquisition, Technology and Logistics (USD (AT&L)) Acquisition Decision Memorandum (ADM) dated 15 April 2009 designated the Army as the lead service for developing this capability for rotary-wing, tilt-rotor, and small fixed-wing aircraft across the Department of Defense. It also designated the program as an Acquisition Category (ACAT) ID special interest program. The Army has designated the acquisition effort for this capability as the CIRCM program. CIRCM is being evaluated as a potential replacement for Guardian Laser Tracker Assemblies (GLTA) on the DoN LAIRCM system.

Distributed Aperture Infrared Countermeasure (DAIRCM) developmental activities in hardware and software are being pursued to reduce the size, weight and power required to achieve a threat warning detection system integrated with an infrared countermeasure. DAIRCM development, integration and testing will first be conducted in a federated configuration to support Joint Urgent Operational Need Statement (JUONS) SO-0010 with follow-on work beginning in FY 2018 to provide an integrated (under glass) solution to host platforms. This program develops integrated hardware/software solutions that link on-board integrated Aircraft Survivability Equipment (iASE) that are compatible with mission planning information and store sensor data for post mission threat analysis. This project also adopts future multi-band, networking capabilities to facilitate real-time transfer of threat information, and off-board queuing and control of onboard sensors. CIRCM Funds for FY19 through FY23 are realigned to DAIRCM PU 3348.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** CIRCM Technology Development (TD) | 59.753 | 5.965 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | 5 | - | - | - | - |
| ***FY 2018 Plans:***<br>Continuation of EMD contract and GLTA replacement evaluation study. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604272N / *Tact Air Dir Infrared CM (TADIRCM)* | **Project (Number/Name)**<br>3304 / *CIRCM* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Continuation of EMD contract.<br>***FY 2019 Base Plans:***<br>CIRCM efforts realigned to support DAIRCM PU 3348.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>CIRCM Funds decreased due to realignment to DAIRCM PU 3348. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 59.753 | 5.965 | 0.000 | 0.000 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Common Infrared Countermeasures (CIRCM) was a new start for the Navy in FY 2013. CIRCM is an Acquisition Category (ACAT) ID Army lead acquisition program for the development, integration and production of an infrared countermeasure for US Army, US Navy, and US Marine Corps assault aircraft. The Army conducted a 21 month competitive prototyping Technology Development (TD) phase with two contractors. During the TD phase, the contractors developed TD test articles for various test events with emphasis placed on reliability. Contractors concurrently developed preliminary designs for the CIRCM system, conducted systems requirements review, system functional review, and preliminary design review systems engineering technical review events at appropriate times in the schedule. Upon completion of the TD phase, the Army conducted a competition for award of Engineering Manufacturing Development (EMD) contract(s). The EMD phase will be no more than 26 months and will include critical design reviews, test readiness reviews, procurement of 5 EMD test articles in FY 2017 for USN evaluation.

The federated DAIRCM system was chosen as the material solution to JUONS SO-0010 and funded via Rapid Acquisition Authority (RAA) with follow-on funding supplied via FY 2017 and FY 2018 Overseas Contingency Operations funding to complete the development, integration and test to support initial fielding in FY 2019. Department of Navy is in the process of developing a Capability Production Document (CPD) to support the transition to an integrated (under glass) solution. Development of the integrated DAIRCM solution will begin in FY 2018.

FY2017:
Procured 5 CIRCM test assets

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604272N / *Tact Air Dir Infrared CM (TADIRCM)* | **Project (Number/Name)**<br>3304 / *CIRCM* |

FY2018:
Guardian Laser Tracker Assemblies(GLTA) Replacement evaluation

**E. Performance Metrics**

FY2017:
Procured EMD Test assets

FY2018:
Guardian Laser Tracker Assemblies(GLTA) Replacement evaluation

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604272N / *Tact Air Dir Infrared CM (TADIRCM)* | **Project (Number/Name)**<br>3304 / *CIRCM* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Primary HDW Dev CIRCM | C/CPAF | NGC : Rolling Meadows | 0.985 | 1.736 | Apr 2017 | 5.250 | Mar 2018 | 0.000 | | - | | 0.000 | 0.000 | 7.971 | 7.971 |
| Sys Eng Govt CIRCM | WR | NAWC : Patuxent River, MD | 6.025 | 7.832 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 13.857 | - |
| Contractor Eng Supt CIRCM | C/CPFF | Alair : Lorton, VA | 2.602 | 2.500 | Apr 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 5.102 | 5.102 |
| Primary HDW DEV CIRCM | C/CPIF | DRS : Dallas, TX | 5.389 | 8.866 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 14.255 | 14.255 |
| Sys Eng Govt CIRCM | WR | NRL : Washington DC | 3.535 | 1.300 | Jan 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 4.835 | - |
| Sys Eng Gov CIRCM | WR | NUWC : Jacksonville, FL | 0.586 | 1.168 | Apr 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.754 | - |
| Primary HDW DEV CIRCM | WR | NRL : Washington DC | 0.000 | 17.100 | Aug 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 17.100 | - |
| | | **Subtotal** | 19.122 | 40.502 | | 5.250 | | 0.000 | | - | | 0.000 | 0.000 | 64.874 | N/A |

**Remarks**

FY 2017 overseas contingency operations funding is required for developmental activities in hardware and software to reduce the size, weight, and power required to achieve a missile warning detection system compatible with mission planning information that stores sensor data for post mission threat analysis. Although not included the budget controls $162.9 million funding is encumbered in support of Joint Urgent Operational Needs Statement SO-0010, entitled "Federated Distributed Aperture Infrared Countermeasures (DAIRCM)" via Rapid Acquisition Authority ontract awarded March 2016.

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Integrated Logistics CIRCM I | WR | NAWC AD : Patuxent River, MD | 2.202 | 0.657 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.859 | - |
| Integrated Logistics CIRCM II | C/CPFF | Wyle Labs : Huntsville, AL | 1.531 | 0.314 | Mar 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.845 | 1.845 |
| SW Dev CIRCM | WR | NAWCWD : Pt. Mugu, CA | 4.050 | 1.802 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 5.852 | - |
| | | **Subtotal** | 7.783 | 2.773 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 10.556 | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604272N / *Tact Air Dir Infrared CM (TADIRCM)* | Project (Number/Name)<br>3304 / *CIRCM* | |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eng & Eval CIRCM | C/CPFF | Eglin AF Base : Fort Walton Beach FL | 0.480 | 4.182 | Dec 2016 | 0.500 | Oct 2017 | 0.000 | | - | | 0.000 | 0.000 | 5.162 | 5.162 |
| Eng & Eval Govt CIRCM | WR | NAWC : Patuxent River, MD | 1.641 | 3.947 | Jan 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 5.588 | - |
| Eng & Eval Govt CIRCM | WR | COTF : VA | 0.100 | 0.455 | Jan 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.555 | - |
| Test Equipment | WR | NRL : Washington, DC | 0.000 | 3.911 | Aug 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.911 | - |
| Eng & Eval Govt CIRCM | WR | NAWC : China Lake | 0.000 | 0.132 | Aug 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.132 | - |
| Test Assets | WR | Threat Systems Mgt : Redstone AL | 0.000 | 2.525 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.525 | - |
| | | **Subtotal** | 2.221 | 15.152 | | 0.500 | | 0.000 | | - | | 0.000 | 0.000 | 17.873 | N/A |

**Management Services ($ in Millions)**

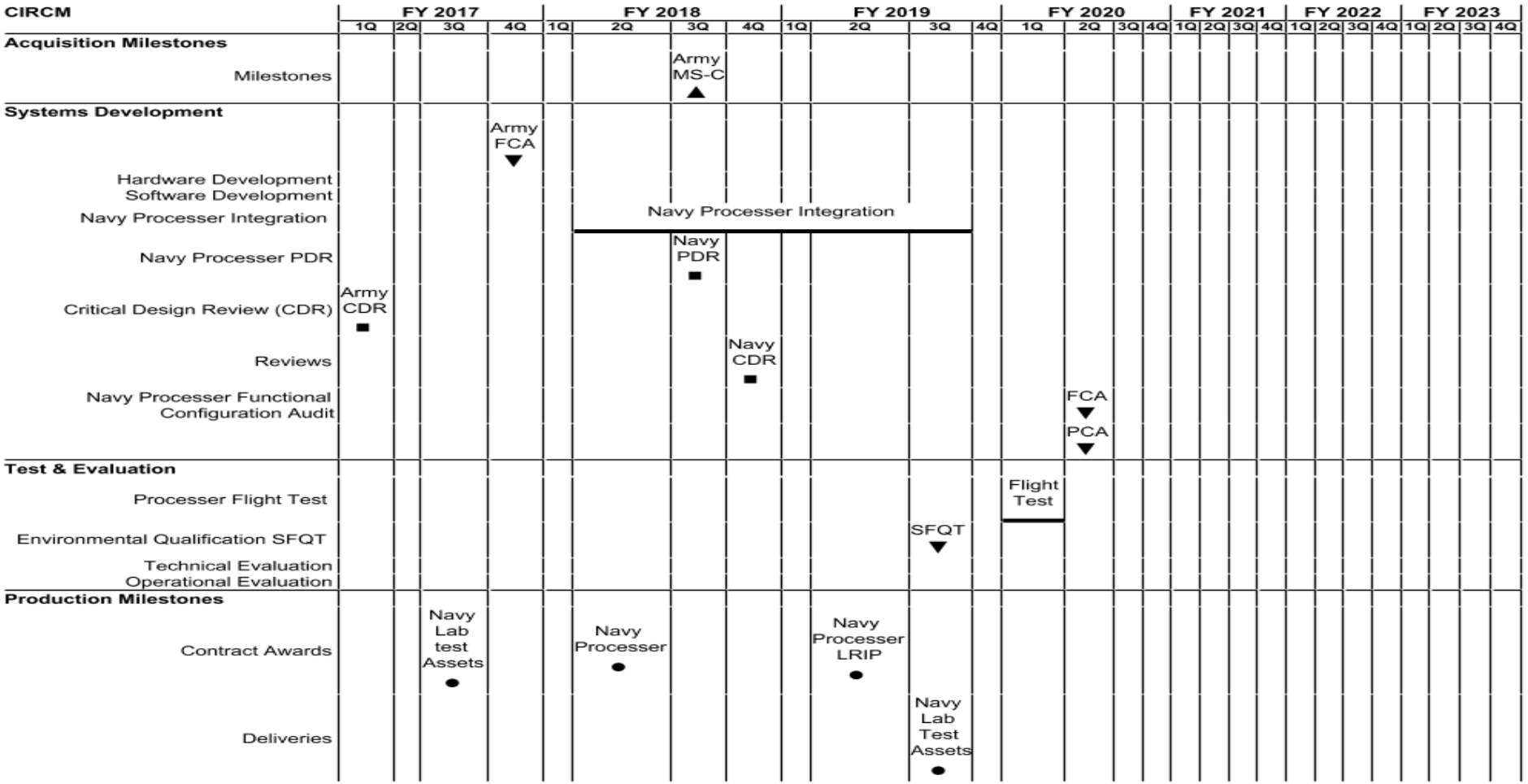
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Contractor PM Supt CIRCM | C/CPFF | American Electronics : Patuxent River, MD | 1.014 | 0.110 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.124 | 1.124 |
| Govt Eng Supt CIRCM | WR | NAWCWD : Pt. Mugu, CA | 0.665 | 0.093 | Dec 2016 | 0.215 | Jul 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.973 | - |
| Travel CIRCM | WR | NAVAIR : Various | 0.490 | 0.155 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.645 | - |
| Cost Analysis Supt CIRCM | WR | NAWCAD : Patuxent River, MD | 0.645 | 0.597 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.242 | - |
| Contractor ILS Supt CIRCM | C/CPFF | NSI : Patuxent River, MD | 0.000 | 0.174 | Mar 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.174 | 0.174 |
| Contractor Eng Supt | C/CPFF | GEORGIA TECH APPLIED RESEARCH CORPO : Atlanta, Ga | 0.000 | 0.197 | Jun 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.197 | 0.197 |
| | | **Subtotal** | 2.814 | 1.326 | | 0.215 | | 0.000 | | - | | 0.000 | 0.000 | 4.355 | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604272N / *Tact Air Dir Infrared CM (TADIRCM)* | Project (Number/Name)<br>3304 / *CIRCM* | |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 31.940 | 59.753 | | 5.965 | | 0.000 | | - | | 0.000 | 0.000 | 97.658 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604272N / *Tact Air Dir Infrared CM (TADIRCM)* | **Project (Number/Name)**<br>3304 / *CIRCM* |



| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604272N / *Tact Air Dir Infrared CM (TADIRCM)* | **Project (Number/Name)**<br>3304 / *CIRCM* |

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| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604272N / *Tact Air Dir Infrared CM (TADIRCM)* | **Project (Number/Name)**<br>3304 / *CIRCM* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***CIRCM*** | | | | |
| Acquisition Milestones: Milestones: Army Milestone C (MS-C) | 3 | 2018 | 3 | 2018 |
| Systems Development: Army Functional Configuration Audit (FCA) | 4 | 2017 | 4 | 2017 |
| Systems Development: Navy Processer Integration: Navy Processer | 2 | 2018 | 3 | 2019 |
| Systems Development: Navy Processer PDR: Navy Processer PDR | 3 | 2018 | 3 | 2018 |
| Systems Development: Critical Design Review (CDR): Army CDR | 1 | 2017 | 1 | 2017 |
| Systems Development: Reviews: Navy Processer CDR | 4 | 2018 | 4 | 2018 |
| Systems Development: Navy Processer Functional Configuration Audit: Functional Configuration Audit (FCA) | 2 | 2020 | 2 | 2020 |
| Systems Development: Navy Processer Functional Configuration Audit: Physical Configuration Audit (PCA) | 2 | 2020 | 2 | 2020 |
| Test & Evaluation: Processer Flight Test: Flight Test | 1 | 2020 | 1 | 2020 |
| Test & Evaluation: Environmental Qualification SFQT: Environmental Qualification SFQT | 3 | 2019 | 3 | 2019 |
| Test & Evaluation: Operational Evaluation: Schedule Detail | 1 | 2017 | 1 | 2023 |
| Test & Evaluation: Operational Evaluation: Navy Flight Test | 1 | 2017 | 1 | 2023 |
| Production Milestones: Contract Awards: Navy Lab test Assets | 3 | 2017 | 3 | 2017 |
| Production Milestones: Contract Awards: Navy Processer Contract | 2 | 2018 | 2 | 2018 |
| Production Milestones: Contract Awards: Navy Processer LRIP (Separate contract) | 2 | 2019 | 2 | 2019 |
| Production Milestones: Deliveries: NAVY Lab Assets Deliveries | 3 | 2019 | 3 | 2019 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604272N / *Tact Air Dir Infrared CM (TADIRCM)* | Project (Number/Name)<br>3348 / *DAIRCM Development* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3348: *DAIRCM Development* | 0.000 | 0.000 | 46.589 | 47.278 | - | 47.278 | 48.907 | 51.979 | 35.605 | 36.409 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Distributed Aperture Infrared Countermeasures (DAIRCM) Developmental activities in hardware and software are being pursued to reduce the size, weight and power required to achieve a threat warning detection system integrated with an infrared countermeasure. DAIRCM development, integration and testing will first be conducted in a federated configuration to support Joint Urgent Operational Needs Statement (JUONS) SO-0010 to provide increased survivability against Man-Portable Air Defense Systems (MANPADS), Rocket Propelled Grenades (RPG), hostile gunfire, Anti-
Aircraft Artillery (AAA) and laser-directed weapons. Follow-on work begins in FY 2018 to provide an integrated (under glass) solution to the host platforms and will include development efforts to procure future threat technologies. This program develops integrated hardware/software solutions that link on-board integrated Aircraft Survivability Equipment (iASE) that are compatible with mission planning information and store sensor data for post mission threat analysis. This program also adopts future multi-band, networking capabilities to facilitate real-time transfer of threat information, and off-board queuing and control of onboard sensors.

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under ADVANCED COMPONENT DEVELOPMENT AND PROTOTYPES because it includes all efforts necessary to evaluate integrated technologies, representative models or prototype systems in a high fidelity and realistic operating environment.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** DAIRCM Development | 0.000 | 46.589 | 47.278 | 0.000 | 47.278 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Planning is beginning in FY 2018 to support Integrated DAIRCM efforts.<br><br>OCO:<br>Planning is beginning in FY 2018 to support Integrated DAIRCM efforts. | | | | | |
| ***FY 2019 Base Plans:***<br>Continuation of integrated DAIRCM efforts | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604272N / *Tact Air Dir Infrared CM (TADIRCM)* | **Project (Number/Name)**<br>3348 / *DAIRCM Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Funds increased for continued DAIRCM efforts. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 46.589 | 47.278 | 0.000 | 47.278 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • APN/0576: *Assault DIRCM* | 27.460 | 40.970 | 0.000 | 9.820 | 9.820 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 78.250 |

**Remarks**

**D. Acquisition Strategy**

The federated Distributed Aperture Infrared Countermeasures (DAIRCM) system is the solution for small/medium aircraft in response to Joint Urgent Operational Need Statement (JUONS) SO-0010. It was funded in FY16 via Rapid Acquisition Authority (RAA) executed from PUC 3304 CIRCM. Follow-on funding supplied via Overseas Contingency Operations in FY 2017 and FY 2019 APN OCO; FY 2018 RDT&E PUC 3348 . Funding provided to complete the development, integration and test to support initial fielding in FY19. Department of Navy is in the process of developing a Capability Production Document (CPD) to support the transition to an integrated (under glass) solution. Development, integration and test of the integrated solution will occur between FY 2018 and FY 2023.

**E. Performance Metrics**

FY 2018: Program of Record Risk Reduction Delivery Order on Navy BOA scheduled for 3Q18.
FY 2019: Award of ECP to meet statutory regulations scheduled for 3Q19.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604272N / *Tact Air Dir Infrared CM (TADIRCM)* | **Project (Number/Name)**<br>3348 / *DAIRCM Development* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Primary HW Dev DAIRCM | C/CPFF | DRS : Dallas, TX | 0.000 | 0.000 | | 10.024 | Mar 2018 | 11.790 | Jan 2019 | - | | 11.790 | Continuing | Continuing | Continuing |
| Primalry HW Dev DAIRCM | C/CPFF | Daylight Solutions : San Diego, CA | 0.000 | 0.000 | | 3.194 | Mar 2018 | 8.328 | Jan 2019 | - | | 8.328 | Continuing | Continuing | Continuing |
| H-60 Operational Flight Program Dev | C/CPFF | Lockheed Martin : Owego, NY | 0.000 | 0.000 | | 9.420 | Mar 2018 | 5.536 | Jan 2019 | - | | 5.536 | Continuing | Continuing | Continuing |
| H-1 Operational Flight Program Deve | C/CPFF | Northrop Grumman : Woodland Hills, CA | 0.000 | 0.000 | | 5.943 | Mar 2018 | 2.820 | Jan 2019 | - | | 2.820 | Continuing | Continuing | Continuing |
| Govt Eng Support | WR | NAWCAD : Patuxent River, MD | 0.000 | 0.000 | | 2.500 | Jan 2018 | 2.560 | Jan 2019 | - | | 2.560 | Continuing | Continuing | Continuing |
| Govt Eng Support | WR | FRC : Jacksonville, FL | 0.000 | 0.000 | | 0.680 | Jan 2018 | 0.700 | Jan 2019 | - | | 0.700 | Continuing | Continuing | Continuing |
| Govt Software Eng Support | WR | NAWCAD : PT Mugu | 0.000 | 0.000 | | 2.000 | Dec 2017 | 2.000 | Jan 2019 | - | | 2.000 | Continuing | Continuing | Continuing |
| Govt Software Eng Support | WR | NRL : Washington, DC | 0.000 | 0.000 | | 3.807 | Jan 2018 | 2.905 | Jan 2019 | - | | 2.905 | Continuing | Continuing | Continuing |
| Govt Integrated Logistic Support | WR | NAWCAD : Patuxent River, MD | 0.000 | 0.000 | | 0.410 | Jan 2018 | 0.500 | Jan 2019 | - | | 0.500 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 37.978 | | 37.139 | | - | | 37.139 | Continuing | Continuing | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Govt Integrated Logistic Support | WR | Fleet Readiness Center : Jacksonville, FL | 0.000 | 0.000 | | 0.350 | Oct 2017 | 0.350 | Dec 2018 | - | | 0.350 | Continuing | Continuing | Continuing |
| Contractor Logistic Support | SS/CPFF | RIAC : Ft Belvoir, VA | 0.000 | 0.000 | | 0.622 | Oct 2017 | 0.622 | Jan 2019 | - | | 0.622 | Continuing | Continuing | Continuing |
| ESOH support | WR | NAWC WD : China lake | 0.000 | 0.000 | | 0.128 | Oct 2017 | 0.131 | Jan 2019 | - | | 0.131 | Continuing | Continuing | Continuing |
| Material/Equipment | C/CPFF | CSS : ATK | 0.000 | 0.000 | | 0.325 | Oct 2017 | 4.000 | Oct 2018 | - | | 4.000 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604272N / *Tact Air Dir Infrared CM (TADIRCM)* | **Project (Number/Name)**<br>3348 / *DAIRCM Development* |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Integrated Logistic Support | C/CPAF | DTIC : Ft Belvoir, VA | 0.000 | 0.000 | | 0.213 | Jan 2018 | 0.230 | Jan 2019 | - | | 0.230 | Continuing | Continuing | Continuing |
| Commercial Transportation | TBD | Various : Various | 0.000 | 0.000 | | 0.050 | Oct 2017 | 0.050 | Oct 2018 | - | | 0.050 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 1.688 | | 5.383 | | - | | 5.383 | Continuing | Continuing | N/A |

**Remarks**

ATK Material/Equipment contract increase due to SM-932 Upgrade.

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Govt T&E Support | WR | NAWCAD : Patuxent River, MD | 0.000 | 0.000 | | 1.394 | Oct 2017 | 0.210 | Dec 2018 | - | | 0.210 | Continuing | Continuing | Continuing |
| Govt T&E Support | WR | NAWCWD : China Lake, CA | 0.000 | 0.000 | | 0.500 | Feb 2018 | 0.250 | Dec 2018 | - | | 0.250 | Continuing | Continuing | Continuing |
| Live Fire | WR | USA DPG : TBD | 0.000 | 0.000 | | 2.000 | May 2018 | 0.571 | Mar 2019 | - | | 0.571 | Continuing | Continuing | Continuing |
| Contractor T& E Support | TBD | GWEF : Eglin AFB, FL | 0.000 | 0.000 | | 0.500 | Jul 2018 | 1.225 | Feb 2019 | - | | 1.225 | Continuing | Continuing | Continuing |
| Govt T&E Support | WR | COTF : Norfolk, VA | 0.000 | 0.000 | | 0.210 | Dec 2017 | 0.150 | Jun 2019 | - | | 0.150 | Continuing | Continuing | Continuing |
| Govt T&E Support | WR | CRANE : CRANE | 0.000 | 0.000 | | 0.500 | Jan 2018 | 0.525 | Jun 2019 | - | | 0.525 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 5.104 | | 2.931 | | - | | 2.931 | Continuing | Continuing | N/A |

**Remarks**

Contractor T& E Support to GWEF will increase due to 2 events in FY19.

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Govt Eng Support | WR | NAWCWD : China Lake, CA | 0.000 | 0.000 | | 0.200 | Oct 2017 | 0.200 | Dec 2018 | - | | 0.200 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604272N / *Tact Air Dir Infrared CM (TADIRCM)* | **Project (Number/Name)**<br>3348 / *DAIRCM Development* |

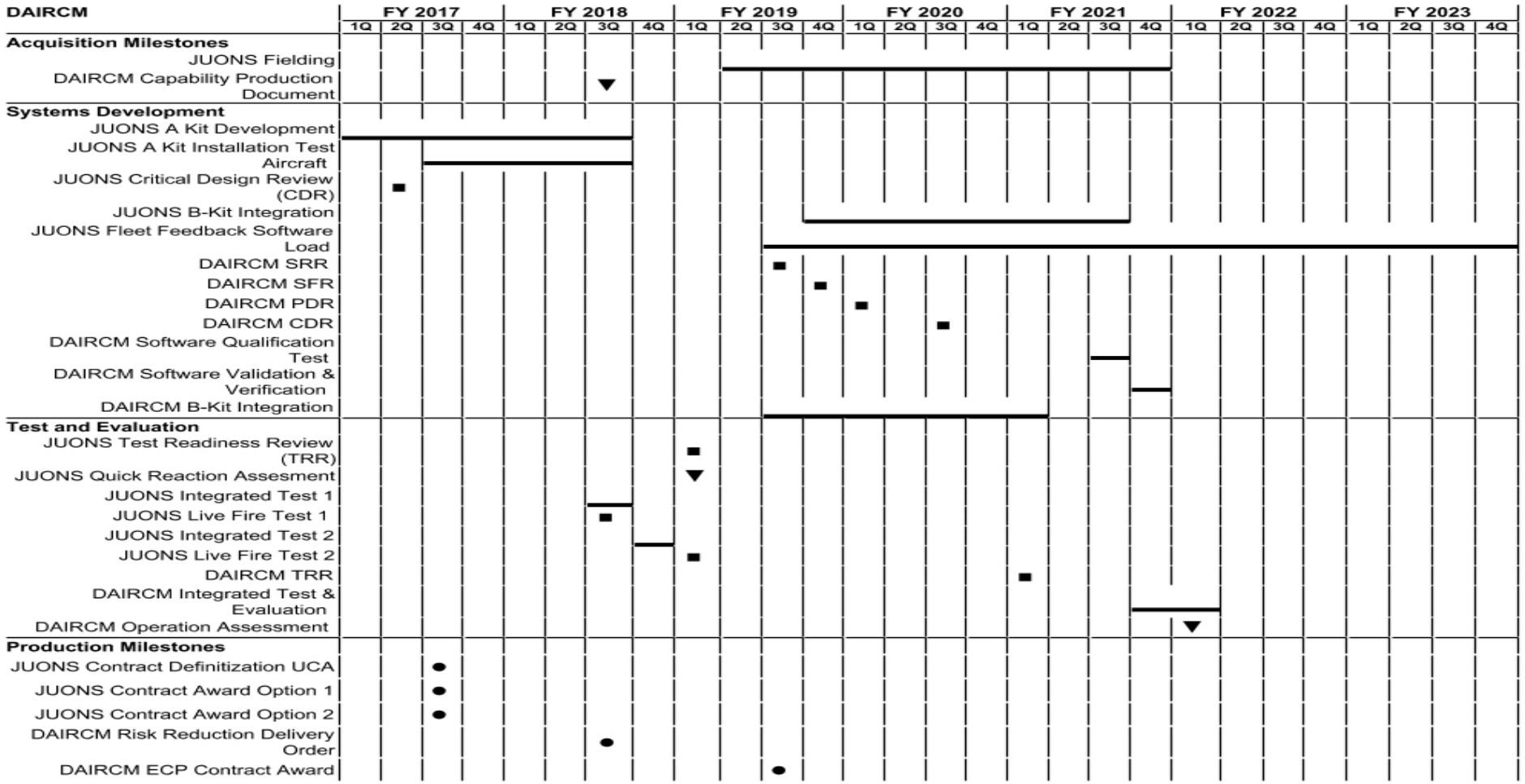
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Amelex Contractor Mgmt Support | C/CPFF | Amelex : Patuxent River, MD | 0.000 | 0.000 | | 0.200 | Nov 2017 | 0.200 | Oct 2018 | - | | 0.200 | Continuing | Continuing | Continuing |
| Engility Contractor Eng Support | C/CPFF | Engility : Patuxent River, MD | 0.000 | 0.000 | | 0.200 | Jun 2018 | 0.200 | Oct 2018 | - | | 0.200 | Continuing | Continuing | Continuing |
| Travel DAIRCM | WR | NAVAIR Various : Patuxent River, MD | 0.000 | 0.000 | | 0.300 | Dec 2017 | 0.300 | Oct 2018 | - | | 0.300 | Continuing | Continuing | Continuing |
| Govt PM support | WR | NAWCWD : Patuxent River, MD | 0.000 | 0.000 | | 0.699 | Dec 2017 | 0.705 | Oct 2018 | - | | 0.705 | Continuing | Continuing | Continuing |
| Govt Eng Support | WR | NSWC : Dahlgren, VA | 0.000 | 0.000 | | 0.020 | Jun 2018 | 0.020 | Nov 2018 | - | | 0.020 | Continuing | Continuing | Continuing |
| Eng Support | C/CPFF | DCS : ALEXANDRIA, VA | 0.000 | 0.000 | | 0.200 | Feb 2018 | 0.200 | Jan 2019 | - | | 0.200 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 1.819 | | 1.825 | | - | | 1.825 | Continuing | Continuing | N/A |

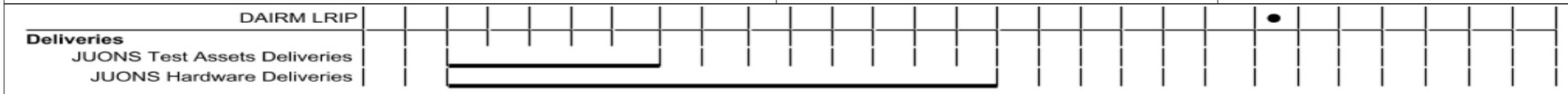
| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 46.589 | | 47.278 | | - | | 47.278 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604272N / *Tact Air Dir Infrared CM (TADIRCM)* | **Project (Number/Name)**<br>3348 / *DAIRCM Development* |



| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604272N / *Tact Air Dir Infrared CM (TADIRCM)* | **Project (Number/Name)**<br>3348 / *DAIRCM Development* |




*2019PB - 0604272N - 3348*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604272N / *Tact Air Dir Infrared CM (TADIRCM)* | **Project (Number/Name)**<br>3348 / *DAIRCM Development* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***DAIRCM*** | | | | |
| Acquisition Milestones: JUONS Fielding: Schedule Detail | 2 | 2019 | 4 | 2021 |
| Acquisition Milestones: DAIRCM Capability Production Document: Schedule Detail | 3 | 2018 | 3 | 2018 |
| Systems Development: JUONS A Kit Development: Schedule Detail | 1 | 2017 | 3 | 2018 |
| Systems Development: JUONS A Kit Installation Test Aircraft: Schedule Detail (TEST) | 3 | 2017 | 3 | 2018 |
| Systems Development: JUONS Critical Design Review (CDR): Schedule Detail | 2 | 2017 | 2 | 2017 |
| Systems Development: JUONS B-Kit Integration: Schedule Detail | 4 | 2019 | 3 | 2021 |
| Systems Development: JUONS Fleet Feedback Software Load: Schedule Detail | 3 | 2019 | 4 | 2023 |
| Systems Development: DAIRCM SRR: Schedule Detail | 3 | 2019 | 3 | 2019 |
| Systems Development: DAIRCM SFR: Schedule Detail | 4 | 2019 | 4 | 2019 |
| Systems Development: DAIRCM PDR: Schedule Detail | 1 | 2020 | 1 | 2020 |
| Systems Development: DAIRCM CDR: Schedule Detail | 3 | 2020 | 3 | 2020 |
| Systems Development: DAIRCM Software Qualification Test: Schedule Detail | 3 | 2021 | 3 | 2021 |
| Systems Development: DAIRCM Software Validation & Verification: Schedule Detail | 4 | 2021 | 4 | 2021 |
| Systems Development: DAIRCM B-Kit Integration: Schedule Detail | 3 | 2019 | 1 | 2021 |
| Test and Evaluation: JUONS Test Readiness Review (TRR): Schedule Detail | 1 | 2019 | 1 | 2019 |
| Test and Evaluation: JUONS Quick Reaction Assesment: Schedule Detail | 1 | 2019 | 1 | 2019 |
| Test and Evaluation: JUONS Integrated Test 1: Schedule Detail | 3 | 2018 | 3 | 2018 |
| Test and Evaluation: JUONS Live Fire Test 1: Schedule Detail | 3 | 2018 | 3 | 2018 |
| Test and Evaluation: JUONS Integrated Test 2: Schedule Detail | 4 | 2018 | 4 | 2018 |
| Test and Evaluation: JUONS Live Fire Test 2: Schedule Detail | 1 | 2019 | 1 | 2019 |
| Test and Evaluation: DAIRCM TRR: Schedule Detail | 1 | 2021 | 1 | 2021 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604272N / *Tact Air Dir Infrared CM (TADIRCM)* | **Project (Number/Name)**<br>3348 / *DAIRCM Development* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Test and Evaluation: DAIRCM Integrated Test & Evaluation: Schedule Detail | 4 | 2021 | 1 | 2022 |
| Test and Evaluation: DAIRCM Operation Assessment: Schedule Detail | 1 | 2022 | 1 | 2022 |
| Production Milestones: JUONS Contract Definitization UCA: Schedule Detail | 3 | 2017 | 3 | 2017 |
| Production Milestones: JUONS Contract Award Option 1: Schedule Detail | 3 | 2017 | 3 | 2017 |
| Production Milestones: JUONS Contract Award Option 2: Schedule Detail | 3 | 2017 | 3 | 2017 |
| Production Milestones: DAIRCM Risk Reduction Delivery Order: Schedule Detail | 3 | 2018 | 3 | 2018 |
| Production Milestones: DAIRCM ECP Contract Award: Schedule Detail | 3 | 2019 | 3 | 2019 |
| Production Milestones: DAIRM LRIP: Schedule Detail | 2 | 2022 | 2 | 2022 |
| Deliveries: JUONS Test Assets Deliveries: Schedule Detail | 3 | 2017 | 3 | 2018 |
| Deliveries: JUONS Hardware Deliveries: Schedule Detail | 3 | 2017 | 3 | 2020 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0604286M *I (U)Marine Corps Additive Manufacturing Tech Dev* |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Program Element | 0.000 | 0.000 | 6.200 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 6.200 |
| 2741: *Additive Manufacturing* | 0.000 | 0.000 | 6.200 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 6.200 |

**Note**

-In FY19 these efforts transition to PE 0604289M.

**A. Mission Description and Budget Item Justification**

This program element supports cost associated with the research and development of Marine Corps Systems Command policy, acquisition process modifications, and prototyping to support the USMC Additive Manufacturing (AM) Initiative under the direction of DC I&L.

The USMC Additive Manufacturing Initiative is an initiative intended to give Marine units access to additive manufacturing techniques to allow them the opportunity to exercise innovation in the resolution of issues affecting unit combat readiness. This PE will support of the development of procedures to enable the approval and manufacturing of items requested from Marines. This involves the development of Marine Corps Policy, an approval process, engineering analysis and testing, establishment of facilities to produce prototype additive manufactured parts and development of training to support the Marine Corps use of additive manufacturing. This initiative incorporates development of strategic partnerships with other DoN Systems Commands and field activities to develop DoN standards, processes and other associated acquisition activities to support future use of additive manufacturing in DoN acquisition and readiness areas.

The Next Generation Logistics (NexLog) project supports cost associated with the research and development, experimentation and limited, rapid fielding of emerging logistics capabilities necessary to enable the Fleet Marine Forces to execute the Marine Corps Operating Concept and inform logistics policies. These emerging logistics capabilities include development of autonomous ground, surface and sub-surface materiel distribution systems; development of operational and tactical, in-field digital fabrication capabilities; and, the development of sensor-driven logistics information technology. This element also supports development of strategic partnerships with DoN Systems Commands and field activities in order to leverage their capabilities and align DoN standards and processes, while furthering the use of additive manufacturing, and other emerging logistics technologies, to increase warfighter readiness, capability, survivability and effectiveness.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0604286M *I (U)Marine Corps Additive Manufacturing Tech Dev* |

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 0.000 | 6.200 | 6.200 | - | 6.200 |
| Current President's Budget | 0.000 | 6.200 | 0.000 | - | 0.000 |
| Total Adjustments | 0.000 | 0.000 | -6.200 | - | -6.200 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | - | - | | | |
| • Program Adjustments | 0.000 | 0.000 | 5.000 | - | 5.000 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -11.200 | - | -11.200 |

**Change Summary Explanation**

Decrease in FY19 is due to realignment of funds to PE 0604289M.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604286M / *(U)Marine Corps Additive Manufacturing Tech Dev* | Project (Number/Name)<br>2741 / *Additive Manufacturing* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2741: *Additive Manufacturing* | 0.000 | 0.000 | 6.200 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 6.200 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

This project supports cost associated with the research and development of Marine Corps Systems Command policy, acquisition process modifications, prototyping, and future logistics innovations to support the USMC Additive Manufacturing (AM) Initiative under the direction of DC I&L.

The USMC Additive Manufacturing Initiative is an initiative intended to give Marine units access to additive manufacturing techniques to allow them the opportunity to exercise innovation in the resolution of issues affecting unit combat readiness. This effort supports the development of procedures to enable the approval and manufacturing of items requested from Marines. This involves the development of Marine Corps Policy, an approval process, engineering analysis and testing, establishment of facilities to produce prototype additive manufactured parts and development of training to support the Marine Corps use of additive manufacturing. It also includes research and development of autonomous ground cargo delivery systems, tactical employment of in field digital manufacturing, and sensor driven logistics information technology. This initiative incorporates development of strategic partnerships with other DoN Systems Commands and field activities to develop DoN standards, processes and other associated acquisition activities to support future use of additive manufacturing in DoN acquisition and readiness areas.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Expeditionary Logistics - Legacy Equipment and System Readiness Support | 0.000 | 4.050 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>-Initiate efforts to identify and develop Additive Manufacturing (AM) requirements, verification methods, and technical data needed to acquire AM manufactured components.<br>-Initiate fabrication of prototype hardware, fixtures, and jigs that facilitate design processes and procedures for test and performance verification.<br>-Initiate prototype testing to verify component design and reliability attributes. | | | | | |
| ***FY 2019 Base Plans:***<br>N/A | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604286M / *(U)Marine Corps Additive Manufacturing Tech Dev* | **Project (Number/Name)**<br>2741 / *Additive Manufacturing* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| FY 19 this effort has been realigned to PE 0604289M/Expeditionary Logistics. | | | | | |
| ***Title:*** Expeditionary Logistics - Expeditionary Manufacturing and Repair Processes | 0.000 | 2.150 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>- Initiate system engineering efforts to identify and develop Additive Manufacturing (AM) fabrication requirements, field repair procedures, and technical data needed to effectively repair AM manufactured components.<br>- Initiate certification studies to assess potential performance/integration issues with expeditionary repaired AM parts. | | | | | |
| ***FY 2019 Base Plans:***<br>-In FY19 this effort transitions to PE 0604289M beginning in FY19. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 19 this effort has been realigned to PE 0604289M/Expeditionary Logistics. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 6.200 | 0.000 | 0.000 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The AM program will execute a non-traditional acquisition strategy, due to AM being a set of enabling technologies vice a conventional platform for milestone-driven acquisition. It will incorporate strategic partnerships with other DoN activities, as well as the Joint Staff and services. For that reason, these AM investments are designed to explore future capabilities where AM may resolve gaps in logistical readiness, provide a warfighting solutions, and to mitigate AM-related risk within existing programs of record.

FY 19 this effort has been realigned to PE 0604289M/Expeditionary Logistics.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604286M / *(U)Marine Corps Additive Manufacturing Tech Dev* | **Project (Number/Name)**<br>2741 / *Additive Manufacturing* |

**E. Performance Metrics**

N/A

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604286M / *(U)Marine Corps Additive Manufacturing Tech Dev* | Project (Number/Name)<br>2741 / *Additive Manufacturing* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AM Guidebook development | MIPR | NSWC : Carderock, MD | 0.000 | 0.000 | | 0.630 | Feb 2018 | 0.000 | Mar 2019 | - | | 0.000 | 0.000 | 0.630 | - |
| AM Prototype Parts and Redesign | MIPR | Army : TBD | 0.000 | 0.000 | | 4.220 | Feb 2018 | 0.000 | Mar 2019 | - | | 0.000 | 0.000 | 4.220 | - |
| AM Structure Design | MIPR | Army/ERDC : Vicksburg, MS | 0.000 | 0.000 | | 1.100 | Feb 2018 | 0.000 | Feb 2019 | - | | 0.000 | 0.000 | 1.100 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 5.950 | | 0.000 | | - | | 0.000 | 0.000 | 5.950 | N/A |

**Remarks**

The AM program will execute a non-traditional acquisition strategy, due to AM being a set of enabling technologies vice a conventional platform for milestone-driven acquisition. The funding distribution above reflects research and development efforts for additive manufacturing enabling technologies.

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Support AM Manuf. and Repair Product | MIPR | NSWC : Carderock, MD | 0.000 | 0.000 | | 0.200 | Mar 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.200 | - |
| Travel | Various | TBD : TBD | 0.000 | 0.000 | | 0.050 | Aug 2018 | 0.000 | Jan 2019 | - | | 0.000 | 0.000 | 0.050 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.250 | | 0.000 | | - | | 0.000 | 0.000 | 0.250 | N/A |

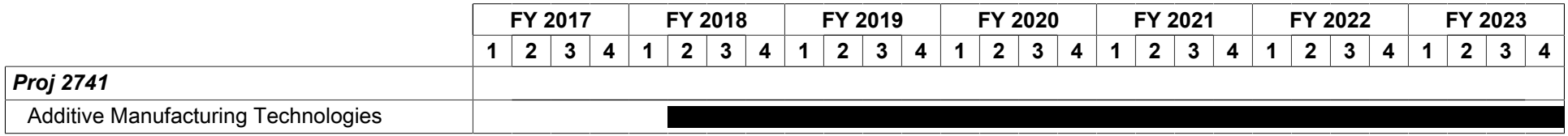
**Remarks**

The AM program will execute a non-traditional acquisition strategy, due to AM being a set of enabling technologies vice a conventional platform for milestone-driven acquisition. The funding distribution above reflects research and development efforts for additive manufacturing enabling technologies.

| | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 6.200 | | 0.000 | | - | | 0.000 | 0.000 | 6.200 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604286M / *(U)Marine Corps Additive Manufacturing Tech Dev* | **Project (Number/Name)**<br>2741 / *Additive Manufacturing* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604286M / *(U)Marine Corps Additive Manufacturing Tech Dev* | **Project (Number/Name)**<br>2741 / *Additive Manufacturing* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 2741*** | | | | |
| Additive Manufacturing Technologies | 2 | 2018 | 4 | 2023 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy* / BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0604289M / *Expeditionary Logistics* |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Program Element | 0.000 | 0.000 | 0.000 | 11.081 | - | 11.081 | 9.194 | 8.608 | 8.318 | 8.389 | Continuing | Continuing |
| 2741: *Additive Manufacturing* | 0.000 | 0.000 | 0.000 | 6.135 | - | 6.135 | 4.245 | 3.654 | 3.360 | 3.430 | Continuing | Continuing |
| 2743: *Next Generation Logistics (NexLog)* | 0.000 | 0.000 | 0.000 | 4.946 | - | 4.946 | 4.949 | 4.954 | 4.958 | 4.959 | Continuing | Continuing |

**Note**

-In FY19 efforts in this PE transferred from PE 0604286M.

**A. Mission Description and Budget Item Justification**

This program element supports cost associated with the research and development of Marine Corps Systems Command policy, acquisition process modifications, and prototyping to support the USMC Additive Manufacturing (AM) Initiative under the direction of Deputy Commandant, Installations and Logistics (DC I&L).

The USMC Additive Manufacturing Initiative is an initiative intended to give Marine units access to additive manufacturing techniques to allow them the opportunity to exercise innovation in the resolution of issues affecting unit combat readiness. This PE will support of the development of procedures to enable the approval and manufacturing of items requested from Marines. This involves the development of Marine Corps Policy, an approval process, engineering analysis and testing, establishment of facilities to produce prototype additive manufactured parts and development of training to support the Marine Corps use of additive manufacturing. This initiative incorporates development of strategic partnerships with other DoN Systems Commands and field activities to develop DoN standards, processes and other associated acquisition activities to support future use of additive manufacturing in DoN acquisition and readiness areas.

The Next Generation Logistics (NexLog) project supports cost associated with the research and development, experimentation and limited, rapid fielding of emerging logistics capabilities necessary to enable the Fleet Marine Forces to execute the Marine Corps Operating Concept and inform logistics policies. These emerging logistics capabilities include development of autonomous ground, surface and sub-surface materiel distribution systems; development of operational and tactical, in-field digital fabrication capabilities; and, the development of sensor-driven logistics information technology. This element also supports development of strategic partnerships with DoN Systems Commands and field activities in order to leverage their capabilities and align DoN standards and processes, while furthering the use of additive manufacturing, and other emerging logistics technologies, to increase warfighter readiness, capability, survivability and effectiveness.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | Date: February 2018 |
|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | R-1 Program Element (Number/Name)<br>PE 0604289M *I Expeditionary Logistics* | | |
| **B. Program Change Summary ($ in Millions)** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** |
| Previous President's Budget | 0.000 | 0.000 | 0.000 | - | 0.000 |
| Current President's Budget | 0.000 | 0.000 | 11.081 | - | 11.081 |
| Total Adjustments | 0.000 | 0.000 | 11.081 | - | 11.081 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | - | - | | | |
| • Rate/Misc Adjustments | 0.000 | 0.000 | 11.081 | - | 11.081 |

**Change Summary Explanation**

In FY19 efforts in this PE transferred from PE 0604286M, which had a $4.9 million increase from 19PB to the current submission (18PB $6.2M, 19PB $11.1M). The overall increase of $4.9 million from FY18 to FY19 is due to NexLog unmanned logistics systems (ground) for small unit maneuver and sustainment , digital manufacturing for in field manufacturing and tactical innovation , and smart logistics for shared warfighter logistics data to collaborate across Marine Air Ground Task Force (MAGTF), to include external partnerships.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604289M / *Expeditionary Logistics* | Project (Number/Name)<br>2741 / *Additive Manufacturing* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2741: *Additive Manufacturing* | 0.000 | 0.000 | 0.000 | 6.135 | - | 6.135 | 4.245 | 3.654 | 3.360 | 3.430 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

This project supports cost associated with the research and development of Marine Corps Systems Command policy, acquisition process modifications, prototyping, and future logistics innovations to support the USMC Additive Manufacturing (AM) Initiative under the direction of DC I&L.

The USMC Additive Manufacturing Initiative is an initiative intended to give Marine units access to additive manufacturing techniques to allow them the opportunity to exercise innovation in the resolution of issues affecting unit combat readiness. This effort supports the development of procedures to enable the approval and manufacturing of items requested from Marines. This involves the development of Marine Corps Policy, an approval process, engineering analysis and testing, establishment of facilities to produce prototype additive manufactured parts and development of training to support the Marine Corps use of additive manufacturing. It also includes research and development of autonomous ground cargo delivery systems, tactical employment of in field digital manufacturing, and sensor driven logistics information technology. This initiative incorporates development of strategic partnerships with other DoN Systems Commands and field activities to develop DoN standards, processes and other associated acquisition activities to support future use of additive manufacturing in DoN acquisition and readiness areas.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Expeditionary Logistics - Expeditionary Manufacturing and Repair Processes | 0.000 | 0.000 | 6.135 | 0.000 | 6.135 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>-See PE 0604286M | | | | | |
| ***FY 2019 Base Plans:***<br>- Continue efforts to identify and develop Additive Manufacturing (AM) requirements, verification methods, and technical data needed to acquire AM manufactured components.<br>-Continue fabrication of prototype hardware, fixtures, and jigs that facilitate design processes and procedures for test and performance verification.<br>- Continue prototype testing to verify component design and reliability attributes.<br>- Continue system engineering efforts to identify and develop AM fabrication requirements, field repair procedures, and technical data needed to effectively repair AM manufactured components.<br>- Continue certification studies to assess potential performance/integration issues with expeditionary repaired AM parts. | | | | | |
| ***FY 2019 OCO Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604289M / *Expeditionary Logistics* | **Project (Number/Name)**<br>2741 / *Additive Manufacturing* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>In FY19 these efforts have been realigned from PE 0604286M/(U)Marine Corps Additive Manufacturing Tech Dev. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 0.000 | 6.135 | 0.000 | 6.135 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • RDTEN/0604286M: *(U)Marine Corps Additive Manufacturing Tech Dev* | 0.000 | 6.200 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 6.200 |

**Remarks**

**D. Acquisition Strategy**

The AM program will execute a non-traditional acquisition strategy, due to AM being a set of enabling technologies vice a conventional platform for milestone-driven acquisition. It will incorporate strategic partnerships with other DoN activities, as well as the Joint Staff and services. For that reason, these AM investments are designed to explore future capabilities where AM may resolve gaps in logistical readiness, provide a warfighting solutions, and to mitigate AM-related risk within existing programs of record.

In FY 19 this effort has been realigned from PE 0604286M/(U)Marine Corps Additive Manufacturing Tech Dev.

**E. Performance Metrics**

N/A

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604289M / *Expeditionary Logistics* | Project (Number/Name)<br>2741 / *Additive Manufacturing* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AM Guidebook development | MIPR | NSWC : Dahlgren, VA | 0.000 | 0.000 | | 0.000 | | 0.200 | Feb 2019 | - | | 0.200 | Continuing | Continuing | Continuing |
| AM Guidebook development | MIPR | NAVSEA/PSU-ARL : State College, PA | 0.000 | 0.000 | | 0.000 | | 0.350 | Feb 2019 | - | | 0.350 | Continuing | Continuing | Continuing |
| AM Guidebook development | MIPR | NSWC : Carderock, MD | 0.000 | 0.000 | | 0.000 | | 0.250 | Mar 2019 | - | | 0.250 | 0.000 | 0.250 | - |
| AM Training Material | MIPR | JHU-APL : Carderock, MD | 0.000 | 0.000 | | 0.000 | | 0.250 | Mar 2019 | - | | 0.250 | 0.000 | 0.250 | - |
| AM Technical Data Package Development | MIPR | NAVAIR : Pax River, MD | 0.000 | 0.000 | | 0.000 | | 0.100 | Feb 2019 | - | | 0.100 | 0.000 | 0.100 | - |
| AM Process Qualification and Certification | MIPR | MITRE : TBD | 0.000 | 0.000 | | 0.000 | | 0.400 | Feb 2019 | - | | 0.400 | 0.000 | 0.400 | - |
| AM Prototype Parts and Redesign | MIPR | Army : TBD | 0.000 | 0.000 | | 0.000 | | 0.400 | Mar 2019 | - | | 0.400 | 0.000 | 0.400 | - |
| AM Develop USMC Fleet Wide Repository | MIPR | NAVFAC : TBD | 0.000 | 0.000 | | 0.000 | | 0.250 | Feb 2019 | - | | 0.250 | 0.000 | 0.250 | - |
| AM Expeditionary Laboratory and Training Facility | Various | TBD : TBD | 0.000 | 0.000 | | 0.000 | | 0.700 | Feb 2019 | - | | 0.700 | 0.000 | 0.700 | - |
| AM Structure Design | MIPR | rmy/ERDC : Vicksburg, MS | 0.000 | 0.000 | | 0.000 | | 0.500 | Feb 2019 | - | | 0.500 | 0.000 | 0.500 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 3.400 | | - | | 3.400 | Continuing | Continuing | N/A |

**Remarks**

The AM program will execute a non-traditional acquisition strategy, due to AM being a set of enabling technologies vice a conventional platform for milestone-driven acquisition. The funding distribution above reflects research and development efforts for additive manufacturing enabling technologies.

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AM Identification of Legacy Part | C/FFP | GE : Columbus, OH | 0.000 | 0.000 | | 0.000 | | 0.250 | Mar 2019 | - | | 0.250 | 0.000 | 0.250 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604289M / *Expeditionary Logistics* | Project (Number/Name)<br>2741 / *Additive Manufacturing* | |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AM Identification of New Part | MIPR | JHU-APL : Columbia, MD | 0.000 | 0.000 | | 0.000 | | 0.400 | Feb 2019 | - | | 0.400 | Continuing | Continuing | Continuing |
| AM Identify Cases for Prototypes | MIPR | NSWC : Dahlgren, VA | 0.000 | 0.000 | | 0.000 | | 0.300 | Mar 2019 | - | | 0.300 | 0.000 | 0.300 | - |
| AM Program Acquisition Strategy and Sustainment | MIPR | TBD : TBD | 0.000 | 0.000 | | 0.000 | | 0.885 | Feb 2019 | - | | 0.885 | 0.000 | 0.885 | - |
| AM Research Advances 3D Printer Technology | MIPR | NSWC-CD : Carderock, MD | 0.000 | 0.000 | | 0.000 | | 0.250 | Feb 2019 | - | | 0.250 | 0.000 | 0.250 | - |
| AM Identification Advanced Prototyping Lab/ Workspace | MIPR | DTIC / GTRI : TBD | 0.000 | 0.000 | | 0.000 | | 0.600 | Feb 2019 | - | | 0.600 | 0.000 | 0.600 | - |
| Travel | Various | TBD : TBD | 0.000 | 0.000 | | 0.000 | | 0.050 | Jan 2019 | - | | 0.050 | 0.000 | 0.050 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 2.735 | | - | | 2.735 | Continuing | Continuing | N/A |

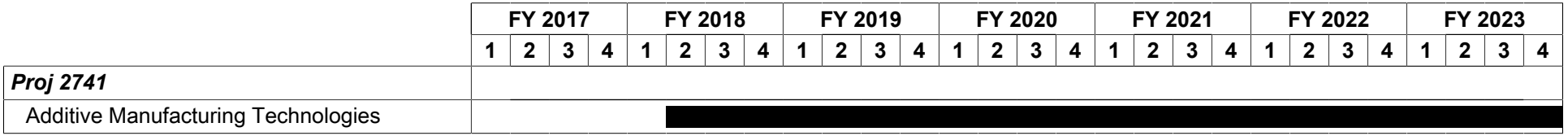
**Remarks**

The AM program will execute a non-traditional acquisition strategy, due to AM being a set of enabling technologies vice a conventional platform for milestone-driven acquisition.
The funding distribution above reflects research and development efforts for additive manufacturing enabling technologies.

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 0.000 | | 6.135 | | - | | 6.135 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604289M / *Expeditionary Logistics* | **Project (Number/Name)**<br>2741 / *Additive Manufacturing* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604289M / *Expeditionary Logistics* | **Project (Number/Name)**<br>2741 / *Additive Manufacturing* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 2741*** | | | | |
| Additive Manufacturing Technologies | 2 | 2018 | 4 | 2023 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604289M / *Expeditionary Logistics* | Project (Number/Name)<br>2743 / *Next Generation Logistics (NexLog)* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2743: *Next Generation Logistics (NexLog)* | 0.000 | 0.000 | 0.000 | 4.946 | - | 4.946 | 4.949 | 4.954 | 4.958 | 4.959 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The Next Generation Logistics (NexLog) project supports cost associated with the research and development, experimentation and limited, rapid fielding of emerging logistics capabilities necessary to enable the Fleet Marine Forces to execute the Marine Corps Operating Concept and inform logistics policies. These emerging logistics capabilities include development of autonomous ground, surface and sub-surface materiel distribution systems; development of operational and tactical, in-field digital fabrication capabilities; and, the development of sensor-driven logistics information technology. This element also supports development of strategic partnerships with DoN Systems Commands and field activities in order to leverage their capabilities and align DoN standards and processes, while furthering the use of additive manufacturing, and other emerging logistics technologies, to increase warfighter readiness, capability, survivability and effectiveness.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Unmanned Logistics Systems-Ground for increased Small Unit Maneuver and Sustainment | 0.000 | 0.000 | 1.600 | 0.000 | 1.600 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>N/A | | | | | |
| ***FY 2019 Base Plans:***<br>- Initiate USMC ULS-G concept of employment, solutions development, and DOTMLPF analysis, in partnership with the<br>US Army.<br>- Initiate commercial autonomy and vehicle testing to assess viability of ground combat cargo autonomy technologies for<br>use in a single vehicle or convoy operations.<br>- Initiate developmental activities to mature amphibious (ship to shore) autonomy technology to create sustainment options for legacy ship to shore connectors. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604289M / *Expeditionary Logistics* | **Project (Number/Name)**<br>2743 / *Next Generation Logistics (NexLog)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Increase of $1.600M from FY 2018 to FY 2019 is due to initiation of ground combat cargo autonomy RDTEN efforts. | | | | | |
| ***Title:*** Digital Manufacturing For In-field Manufacturing and Tactical Innovation<br>***Articles:***<br><br>***FY 2018 Plans:***<br>N/A<br><br>***FY 2019 Base Plans:***<br>- Initiate development of USMC Digital Manufacturing labs, aka Maker Spaces, for warfighter training, technology familiarization, and innovation.<br>- Initiate systems engineering for Organizational-Level (O-Level) deployable tactical manufacturing kits for in-field<br>manufacturing (e.g., in-field 3D printed squad quadcopter) and tactical innovation.<br>- Initiate development commercial, secure, tactical manufacturing information technologies for technical project data<br>sharing, community development, and lessons learned.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Increase of $1.250M from FY 2018 to FY 2019 is due to initiation of USMC Digital Manufacturing labs RDTEN efforts. | 0.000<br>- | 0.000<br>- | 1.250<br>- | 0.000<br>- | 1.250<br>- |
| ***Title:*** Smart Logistics for Shared Warfighter Logistics Data to Collaborate Across MAGTF and External Partners<br>***Articles:***<br><br>***FY 2018 Plans:***<br>N/A<br><br>***FY 2019 Base Plans:***<br>- Initiate systems engineering efforts to develop a Smart Logistics data/IT test environment to assess technologies, mitigate<br>vulnerabilities, develop future system requirements, and support business case analysis.<br>- Initiate assessments of commercially available sensors and data storage for the ability to provide accurate and timely | 0.000<br>- | 0.000<br>- | 2.096<br>- | 0.000<br>- | 2.096<br>- |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604289M / *Expeditionary Logistics* | **Project (Number/Name)**<br>2743 / *Next Generation Logistics (NexLog)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| logistics information awareness.<br>- Initiate the development machine learning-enhanced tactical logistics decision support tools for use in training, garrison, and deployed operations.<br>- Initiate assessments of systems for augmented reality technologies to support supply, maintenance, and medical data<br>visualization.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Increase of $2.096M from FY 2018 to FY 2019 is due to initiation of Smart Logistics for Shared Warfighter Data RDTEN efforts. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 0.000 | 4.946 | 0.000 | 4.946 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

NexLog will incorporate strategic partnerships with other DoN activities, as well as the Joint Staff and services. For that reason, these investments are designed to explore future capabilities that may resolve gaps in logistical readiness, provide a warfighting solutions, and to mitigate Log-related risk within existing programs of record.

In FY 19 this effort has been realigned from PE 0604286M/(U)Marine Corps Additive Manufacturing Tech Dev.

**E. Performance Metrics**

N/A

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604289M / *Expeditionary Logistics* | Project (Number/Name)<br>2743 / *Next Generation Logistics (NexLog)* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ULS-G Development | MIPR | NSWC : PANAMA CITY, FL | 0.000 | 0.000 | | 0.000 | | 0.400 | Jan 2019 | - | | 0.400 | Continuing | Continuing | Continuing |
| Develop Maker Labs | C/FFP | Building Momentum : Arlington, VA | 0.000 | 0.000 | | 0.000 | | 0.600 | Jan 2019 | - | | 0.600 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 1.000 | | - | | 1.000 | Continuing | Continuing | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ULS-Ground | C/FFP | TBD : TBD | 0.000 | 0.000 | | 0.000 | | 0.350 | Jan 2019 | - | | 0.350 | 0.000 | 0.350 | - |
| ULS-Ground COTS | C/FFP | TBD : TBD | 0.000 | 0.000 | | 0.000 | | 0.800 | Feb 2019 | - | | 0.800 | 0.000 | 0.800 | - |
| SE for Tactical Manufacturing Kits | MIPR | NSWC - CD : Carderock, MD | 0.000 | 0.000 | | 0.000 | | 0.400 | Jan 2019 | - | | 0.400 | 0.000 | 0.400 | - |
| Tactical Manufacturing Data and IT | MIPR | NSWC - CD : Carderock, MD | 0.000 | 0.000 | | 0.000 | | 0.250 | Jan 2019 | - | | 0.250 | 0.000 | 0.250 | - |
| Smart Log COTS Sensors Assessment | C/FFP | TBD : TBD | 0.000 | 0.000 | | 0.000 | | 0.600 | Mar 2019 | - | | 0.600 | 0.000 | 0.600 | - |
| Smart Log AI Tools | C/FFP | TBD : TBD | 0.000 | 0.000 | | 0.000 | | 0.300 | Mar 2019 | - | | 0.300 | 0.000 | 0.300 | - |
| Smart Log Augmented Reality Assessment | C/FFP | TBD : TBD | 0.000 | 0.000 | | 0.000 | | 0.350 | Mar 2019 | - | | 0.350 | 0.000 | 0.350 | - |
| Travel | Various | TBD : TBD | 0.000 | 0.000 | | 0.000 | | 0.050 | Jan 2019 | - | | 0.050 | 0.000 | 0.050 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 3.100 | | - | | 3.100 | 0.000 | 3.100 | N/A |

**Test and Evaluation ($ in Millions)**

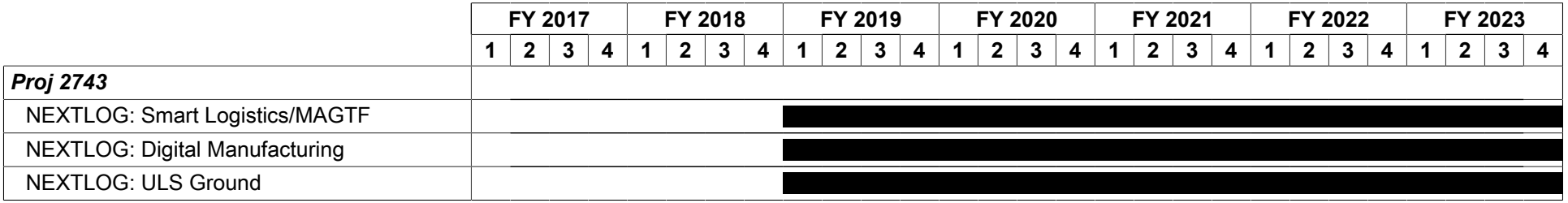
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SE for Smart Log TEST/ DEC | C/FFP | TBD : TBD | 0.000 | 0.000 | | 0.000 | | 0.846 | Mar 2019 | - | | 0.846 | 0.000 | 0.846 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 0.846 | | - | | 0.846 | 0.000 | 0.846 | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604289M / *Expeditionary Logistics* | Project (Number/Name)<br>2743 / *Next Generation Logistics (NexLog)* | |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 0.000 | | 4.946 | | - | | 4.946 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604289M / *Expeditionary Logistics* | **Project (Number/Name)**<br>2743 / *Next Generation Logistics (NexLog)* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604289M / *Expeditionary Logistics* | **Project (Number/Name)**<br>2743 / *Next Generation Logistics (NexLog)* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 2743*** | | | | |
| NEXTLOG: Smart Logistics/MAGTF | 1 | 2019 | 4 | 2023 |
| NEXTLOG: Digital Manufacturing | 1 | 2019 | 4 | 2023 |
| NEXTLOG: ULS Ground | 1 | 2019 | 4 | 2023 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0604292N *I (U)MH-XX* |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Program Element | 7.469 | 1.618 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 9.087 |
| 2934: *MH-XX* | 7.469 | 1.618 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 9.087 |

**A. Mission Description and Budget Item Justification**

The MH-XX project directs developmental activities in support of the replacement of the current inventory of Navy and Marine Corps helicopters in the 2030+ timeframe through the Joint Future Vertical Lift (FVL) family of systems program. Specific developmental activities will include: capability requirements definition, documentation, and approval; support to the Joint Multi-Role Technology Demonstrator and Joint Future Vertical Lift, including Common Systems Integrated Product Team leadership, open hardware and software reference and objective architectures definition, mission system interoperability, and shipboard compatibility; Analysis of Alternatives planning and execution; and associated affordability studies. Follow-on activities support preparation and execution of efforts to develop common systems reference and objective open architectures, and eventual prototype aircraft flight demonstrations in support of the FVL Technology Maturation and Risk Reduction acquisition phase. Activities and technologies developed also have the potential to be leveraged for sustainment of legacy Navy and Marine Corps helicopters. These efforts will enable timely development of a system which provides best value and capability to the Joint Warfighter while maintaining effective and efficient war fighting capability in support of the Navy/Marine Corps 30-year Aviation Plan.

The MH-XX Program has been terminated in FY 2018 and out pending results of the MH-60S Service Life Assessment Program.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 1.620 | 0.000 | 0.000 | - | 0.000 |
| Current President's Budget | 1.618 | 0.000 | 0.000 | - | 0.000 |
| Total Adjustments | -0.002 | 0.000 | 0.000 | - | 0.000 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -0.002 | 0.000 | | | |
| • Rate/Misc Adjustments | 0.000 | 0.000 | 0.000 | - | 0.000 |

**Change Summary Explanation**

Technical: Not applicable.

Schedule: The schedule has been updated to add the delivery of a Radio Frequency (RF) Survivability Assessment Study. The development and delivery of the RF Survivability Assessment Study will inform upgrade options for the MH-60S Radar Warning Receiver systems.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604292N / *(U)MH-XX* | Project (Number/Name)<br>2934 / *MH-XX* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2934: *MH-XX* | 7.469 | 1.618 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 9.087 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The MH-XX project directs Naval Aviation developmental activities in support of the replacement of the Navy H-60 series helicopters, multi-mission medium lift helicopter capability, in the 2030+ timeframe. These aircraft will be used extensively to protect Joint assets from airborne, surface, and sub-surface threats. Other supported mission areas will include Combat Search and Rescue, Naval Special Warfare, Humanitarian Assistance/Disaster Relief, Logistics, and Medical Evacuation. Specific developmental activities will include: capability requirements definition documentation, and approval; support to the Joint Multi-Role Technology Demonstrator (JMR TD) and Joint Future Vertical Lift including Common Systems Integrated Product Team leadership, open hardware and software reference and objective architectures definition, common hardware prototyping efforts, mission system interoperability, and shipboard compatibility; Analysis of Alternatives planning and execution; and associated affordability studies. These activities will result in completion of all pre-system acquisition documentation required for a Material Development Decision in first quarter FY 2017. These efforts will enable timely development of a system which provides best value to the Joint Warfighter and Naval Aviation while maintaining effective and efficient war fighting capability in support of the Navy's 30-year Aviation Plan.

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under ADVANCED COMPONENT DEVELOPMENT AND PROTOTYPES because it includes efforts necessary to evaluate integrated technologies, representative models or prototype systems in a high fidelity and realistic operating environment.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** MH-XX Requirements Definition and Acquisition Documentation | 1.618 | 0.000 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>N/A | | | | | |
| ***FY 2019 Base Plans:***<br>N/A | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 1.618 | 0.000 | 0.000 | 0.000 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604292N / *(U)MH-XX* | **Project (Number/Name)**<br>2934 / *MH-XX* |

**C. Other Program Funding Summary ($ in Millions)**

**Remarks**

**D. Acquisition Strategy**

Provide research and development support for Pre-Milestone A activities, predominantly government, to enable replacement of the Navy H-60 series helicopters, multi-mission medium lift helicopter capability, in the 2030+ timeframe.

**E. Performance Metrics**

Completion of business metrics and reference architecture white papers.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604292N / *(U)MH-XX* | **Project (Number/Name)**<br>2934 / *MH-XX* |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Government Engineering Support | WR | NAWCAD : Patuxent River, MD | 3.202 | 0.504 | Aug 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.706 | - |
| Trade Studies/ Requirements Analysis | Various | Various : Various | 3.317 | 1.011 | Apr 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 4.328 | - |
| | | **Subtotal** | 6.519 | 1.515 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 8.034 | N/A |

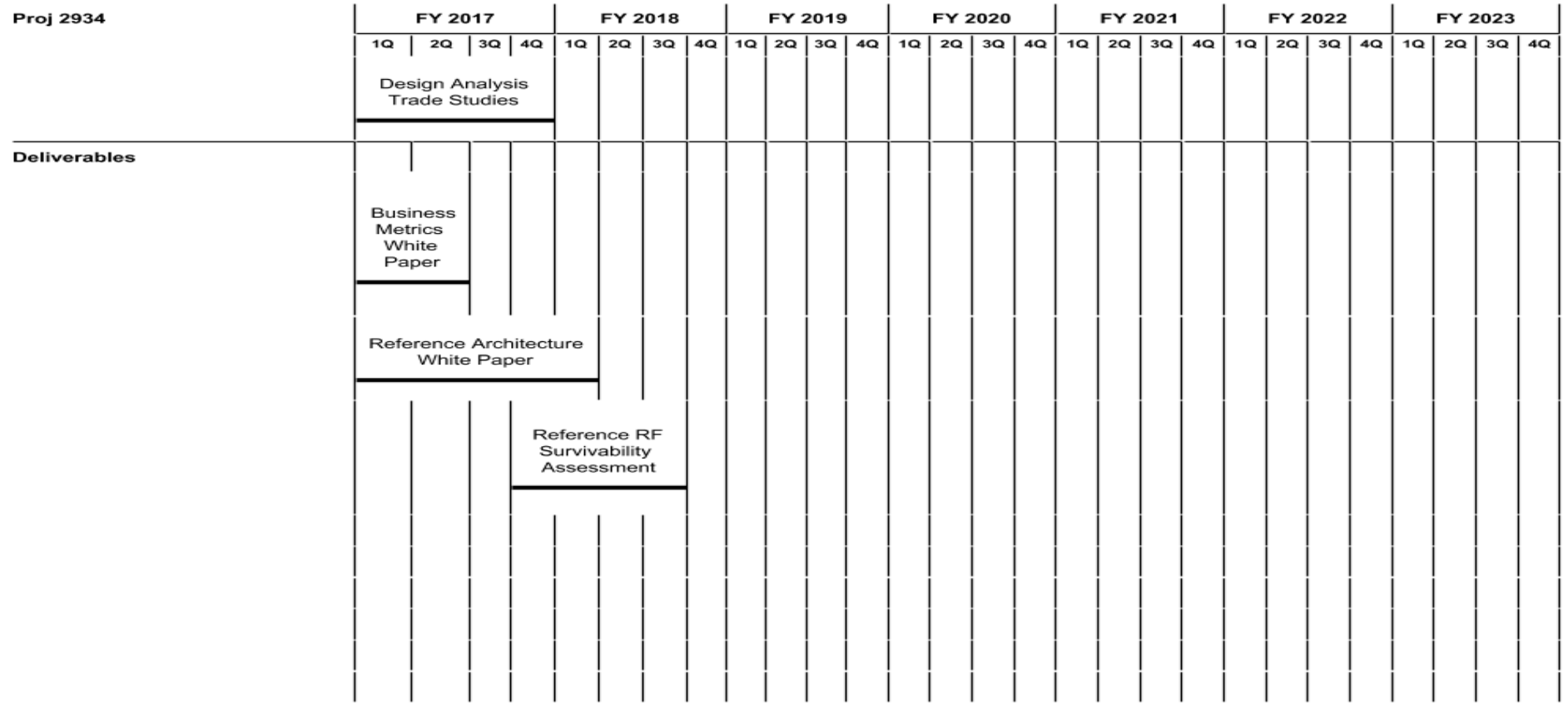
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management | WR | NAWCAD : Patuxent River, MD | 0.920 | 0.084 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.004 | - |
| Travel | Various | Various : Various | 0.030 | 0.019 | Oct 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.049 | - |
| | | **Subtotal** | 0.950 | 0.103 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.053 | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 7.469 | 1.618 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 9.087 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604292N / *(U)MH-XX* | **Project (Number/Name)**<br>2934 / *MH-XX* |




*2019DON - 0604292N - 2934*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604292N / *(U)MH-XX* | **Project (Number/Name)**<br>2934 / *MH-XX* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 2934*** | | | | |
| Acquisition Milestones: Planning: Design Analysis Trade Studies | 1 | 2017 | 4 | 2017 |
| Deliverables: Business Metrics White Paper | 1 | 2017 | 2 | 2017 |
| Deliverables: Reference Architecture White Paper | 1 | 2017 | 1 | 2018 |
| Deliverables: RF Survivability Assessment | 4 | 2017 | 3 | 2018 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0604320M *I Rapid Technology Capability Prototype* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 0.000 | 0.000 | 7.055 | 7.107 | - | 7.107 | 7.271 | 7.423 | 7.576 | 7.734 | Continuing | Continuing |
| 0386: *Rapid Prototype Development, Marine Corps* | 0.000 | 0.000 | 7.055 | 7.107 | - | 7.107 | 7.271 | 7.423 | 7.576 | 7.734 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

The Commandant of the Marine Corps (CMC) directed the formation of the Marine Corps Rapid Capabilities Office (MCRCO) to accelerate the identification, development and assessment of capabilities that appear to offer significant military utility. The MCRCO will seek emergent and disruptive technology to rapidly develop and deliver operational prototypes that increase Operating Forces' survivability and lethality, and that will inform requirement development and investment planning. Prototypes to be assessed will be at a Technology Readiness Level 7 or higher and can be either non developmental government off the shelf, non-developmental commercial off the shelf, or developmental items.

FY18 efforts include, but are not limited to, product development and operational forces assessment for Tactical Electro-Magnetic Signature Operations and Support (TEMSOS), Long Range Precision Fires, and Unmanned Swarm Systems. TEMSOS will provide enhanced uninterruptable intra-unit communications, alternate precision navigation, friendly force electromagnetic signature monitoring, enhanced situational awareness, and tactical advantage through electronic attack. Unmanned Swarm Systems provide small armored aerial survey, search, and attack capabilities fused with artificial intelligence to enhance situational awareness and decision making. Long Range Precision Fires will provide long-range guided anti-armor precision fires with both on-board and meshed data links for enhanced targeting accuracy for this small unmanned aircraft munition. These three capabilities have been identified as key immediate Operational Force survivability and lethality enablers to countercurrent enemy capabilities.

FY19 efforts include Autonomous Vehicles, Tactical Information Warfare, and Urban Engagement Systems.

Autonomous Vehicles: This effort will identify, prototype, and assess the use in a variety of combat and supporting use employments, vehicles capable of sensing their environment, while navigating and functioning independently without human conduction to take evasive or defensive action and avoid detection, tracking, targeting or attack, provide an alternative reconnoiter capability in non-permissive settings for the purpose of mapping and patrolling for the purpose of intensifying combat power and reducing risk to the force.

Tactical Information Warfare: This effort will identify, prototype, and assess various informations systems that provide small unit ability to undermine local opposing force information quality, while ensuring friendly forces a timely, accurate, superior capability to automatically correlate relevant active and passive information from organic and non-organic sensors that will increase their combat effectiveness in this emerging warfighting discipline.

Urban Engagement Systems: This effort will identify, prototype and assess small unit systems to provide them enhanced situational awareness to locate and track opposing forces in tall buildings, narrow alleys, sewage tunnels and subway systems in order to minimize friendly force exposure, reduce potential collateral damage, and offer increased force protection measures by means of amplified lethality, improved discrimination ability, and enhances survivability.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0604320M *I Rapid Technology Capability Prototype* |

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 0.000 | 7.055 | 7.196 | - | 7.196 |
| Current President's Budget | 0.000 | 7.055 | 7.107 | - | 7.107 |
| Total Adjustments | 0.000 | 0.000 | -0.089 | - | -0.089 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | - | - | | | |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -0.089 | - | -0.089 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604320M / *Rapid Technology Capability Prototype* | Project (Number/Name)<br>0386 / *Rapid Prototype Development, Marine Corps* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0386: *Rapid Prototype Development, Marine Corps* | 0.000 | 0.000 | 7.055 | 7.107 | - | 7.107 | 7.271 | 7.423 | 7.576 | 7.734 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The Commandant of the Marine Corps (CMC) directed the formation of the Marine Corps Rapid Capabilities Office (MCRCO) to accelerate the identification, development and assessment of capabilities that appear to offer significant military utility. The MCRCO will seek emergent and disruptive technology to rapidly develop and deliver operational prototypes that increase Operating Forces' survivability and lethality, and that will inform requirement development and investment planning. Prototypes to be assessed will be at a Technology Readiness Level 7 or higher and can be either non developmental government off the shelf, non-developmental commercial off the shelf, or developmental items.

MCRCO is not an acquisition program. MCRCO implements one-time buys of various capabilities for operational assessments and does not sustain nor provide enduring support beyond the operational assessment period. If a capability requires sustainment and enduring support it will transition to the traditional acquisition process.

FY19 efforts include Autonomous Vehicles, Tactical Information Warfare, and Urban Engagement Systems.

Autonomous Vehicles: effort will identify, prototype, and assess the use in a variety of combat and supporting use employments, vehicles capable of sensing their environment, while navigating and functioning independently without human conduction to take evasive or defensive action and avoid detection, tracking, targeting or attack, provide an alternative reconnoiter capability in non-permissive settings for the purpose of mapping and patrolling for the purpose of intensifying combat power and reducing risk to the force.

Tactical Information Warfare: effort will identify, prototype, and assess various information systems that provide small unit ability to undermine local opposing force information quality, while ensuring friendly forces a timely, accurate, superior capability to automatically correlate relevant active and passive information from organic and non-organic sensors that will increase their combat effectiveness in this emerging war-fighting discipline.

Urban Engagement Systems: effort will identify, prototype and assess small unit systems to provide them enhanced situational awareness to locate and track opposing forces in tall buildings, narrow alleys, sewage tunnels and subway systems in order to minimize friendly force exposure, reduce potential collateral damage, and offer increased force protection measures by means of amplified lethality, improved discrimination ability, and enhances survivability.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Product Development | 0.000 | 5.630 | 5.878 | 0.000 | 5.878 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604320M / *Rapid Technology Capability Prototype* | **Project (Number/Name)**<br>0386 / *Rapid Prototype Development, Marine Corps* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>- Initiate Certifications/Studies/Reports and Prototype Purchase/Development/Integration of MCRCO portfolio:<br>- Initiate product development of Tactical Electro-Magnetic Spectrum capabilities.<br>- Initiate product development of unmanned aerial, surface, and underwater vehicles (UAV, USV, and UUV) swarm capability.<br>- Initiate product development of a Long Range Precision Fires capability. | | | | | |
| ***FY 2019 Base Plans:***<br>FY19 Product Development Autonomous Vehicles: Initiate efforts to identify, prototype, and assess the use in a variety of combat and supporting use employments, vehicles capable of sensing their environment, while navigating and functioning independently without human conduction to take evasive or defensive action and avoid detection, tracking, targeting or attack, provide an alternative reconnoiter capability in non-permissive settings for the purpose of mapping and patrolling for the purpose of intensifying combat power and reducing risk to the force.<br><br>FY19 Product Development Tactical Information Warfare: Initiate efforts to identify, prototype, and assess various information systems that provide small unit ability to undermine local opposing force information quality, while ensuring friendly forces a timely, accurate, superior capability to automatically correlate relevant active and passive information from organic and non-organic sensors that will increase their combat effectiveness in this emerging war-fighting discipline.<br><br>FY19 Product Development Urban Engagement Systems: Initiate efforts to identify, prototype and assess small unit systems to provide them enhanced situational awareness to locate and track opposing forces in tall buildings, narrow alleys, sewage tunnels and subway systems in order to minimize friendly force exposure, reduce potential collateral damage, and offer increased force protection measures by means of amplified lethality, improved discrimination ability, and enhances survivability. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604320M / *Rapid Technology Capability Prototype* | **Project (Number/Name)**<br>0386 / *Rapid Prototype Development, Marine Corps* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Net increase of $0.248M reflects a slightly higher product development emphasis from FY18 to FY19 within Rapid Prototype Development efforts. | | | | | |
| ***Title:*** Support | 0.000 | 1.050 | 0.566 | 0.000 | 0.566 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>- Initiate Operational Force Assessments of MCRCO portfolio:<br>- Initiate support of Tactical Electro-Magnetic Spectrum capabilities.<br>- Initiate support of unmanned aerial, surface, and underwater vehicles (UAV, USV, and UUV) swarm capability.<br>- Initiate support development and operational assessment of a Long Range Precision Fires capability.<br>***FY 2019 Base Plans:***<br>FY19 Initiate support efforts to include development of a innovation portal and other data collection efforts.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>The decrease of $0.484M reflects a reduction in overall Rapid Prototype Development support costs from FY18 to FY19. | | | | | |
| ***Title:*** Management | 0.000 | 0.375 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>- Initiate Management Services of the new-start MCRCO: Engineering Analysis and program office support<br>***FY 2019 Base Plans:***<br>N/A<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>The decrease of $0.375M reflects a reduction in overall Rapid Prototype Development management costs from FY18 to FY19. | | | | | |
| ***Title:*** Test & Evaluation | 0.000 | 0.000 | 0.663 | 0.000 | 0.663 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604320M / *Rapid Technology Capability Prototype* | **Project (Number/Name)**<br>0386 / *Rapid Prototype Development, Marine Corps* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>N/A<br>***FY 2019 Base Plans:***<br>FY19 Autonomous Vehicles: Initiate efforts to test and evaluate prototypes to assess their use in a variety of combat and supporting use employments. Vehicles tested will be capable of sensing their environment, while navigating and functioning independently without human conduction, taking evasive or defensive action, avoiding detection, tracking, targeting, attacking, provide an alternative reconnoiter capability in non-permissive settings for the purpose of mapping and patrolling for the purpose of intensifying combat power. The purpose of this effort is to reduce risk to the force.<br><br>FY19 Operations Forces (OPFOR) Assessment Information Warfare: Initiate efforts to test and evaluate prototypes to assess various information systems that provide small unit ability to undermine local opposing force information quality, while ensuring friendly forces a timely, accurate, superior capability to automatically correlate relevant active and passive information from organic and non-organic sensors.<br><br>FY19 Operations Forces (OPFOR) Assessment Urban Engagement Systems: Initiate efforts to test and evaluate prototypes to assess a state of the art urban range with appropriate buildings and streets that properly reflect an urban environment. Systems must locate and track opposing forces in tall buildings, narrow alleys, sewage tunnels and subway systems in order to minimize friendly force exposure, reduce potential collateral damage, and offer increased force protection.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>The increase of $0.663M from FY18 to FY19 reflects Test and Evaluation costs in support of FY19 Rapid Prototype Development efforts. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 7.055 | 7.107 | 0.000 | 7.107 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604320M / *Rapid Technology Capability Prototype* | **Project (Number/Name)**<br>0386 / *Rapid Prototype Development, Marine Corps* |

**C. Other Program Funding Summary ($ in Millions)**

**Remarks**

**D. Acquisition Strategy**

The MCRCO Process consists of three phases, Identify, Assess, and Inform, where each have unique function support of the mission. All MCRCO projects will align to this phased approach. In the Identify Phase the MCRCO undertakes a continuous process of investigation and compiling of technologies, concepts, and prototypes for various capability areas. Activities in this phase include but are not limited to research, war gaming/lectures/and external experiment attendance, industry and FFRDC engagements, Innovation Portal Challenges and Forums, gap identification, and emerging technology analysis. This is also where the MCRCO portfolio of projects are determined and approved for execution.

In the Assess Phase the operational assessments are performed by the MCRCO. These assessments of capability prototypes are categorized by complexity of effort and the perceived time it will take to conduct the assessment. The Capability Assessment Categories (CAC) are:

CAC 1 - Non Developmental Capability Prototype - Plug and Play (1-90 days)

CAC 2 - Integration Capability Prototype -Reconfigure and Play (91-180 days)

CAC 3 - Developmental Capability Prototype - Develop and Play (181-360 days)

The assess phase has three utility focuses that prototypes must demonstrate prior to being assessed: Military Utility, Enabling Competition, and Lifecycle Affordability.

The Inform Phase not only provides the results of the assessment event, but it also tracks the performance of the acquisition process. The goal is to deliver the capability rapidly to support warfighter requirements . It focuses its efforts on measuring the time it takes for key acquisition events to occur. These events include but are not limited to requirements transition, contract award, production, test, and fielding. Other Measure of Effectiveness will focus on costs and rework associated with acquisition process.

**E. Performance Metrics**

There will be 33% and 66% assessment reviews, where assessments will either continue forward to completion or project ended. All reviews will be documented in the Capability Assessment Report.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604320M / *Rapid Technology Capability Prototype* | **Project (Number/Name)**<br>0386 / *Rapid Prototype Development, Marine Corps* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Certifications, Studies, Reports_Tactical EM | Various | Not Specified : Not Specified | 0.000 | 0.000 | | 0.500 | Nov 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Certifications, Studies, Reports_Swarm | Various | Not Specified : Not Specified | 0.000 | 0.000 | | 0.500 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.500 | - |
| Certifications, Studies, Reports_Fires | Various | Not Specified : Not Specified | 0.000 | 0.000 | | 0.130 | Jan 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Prototype Purchase, Development, and Integration_Tactical EM | Various | Not Specified : Not Specified | 0.000 | 0.000 | | 1.750 | Nov 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Prototype Purchase, Development, and Integration_Swarm | Various | Not Specified : Not Specified | 0.000 | 0.000 | | 1.750 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 1.750 | - |
| Prototype Purchase, Development, and Integration_Fires | Various | Not Specified : Not Specified | 0.000 | 0.000 | | 1.000 | Jan 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Autonomous Vehicles Development | TBD | NSWC : Panama City, FL | 0.000 | 0.000 | | 0.000 | | 0.250 | Dec 2018 | - | | 0.250 | 0.000 | 0.250 | - |
| Information Warfare Development | TBD | NSWC : Crane, IN | 0.000 | 0.000 | | 0.000 | | 0.250 | Dec 2018 | - | | 0.250 | 0.000 | 0.250 | - |
| Urban Engagement Systems Development | TBD | NSWC : Corona, CA | 0.000 | 0.000 | | 0.000 | | 0.130 | Dec 2018 | - | | 0.130 | 0.000 | 0.130 | - |
| Autonomous Vehicle Contract Award | TBD | MCSC : Quantico, VA | 0.000 | 0.000 | | 0.000 | | 2.248 | Feb 2019 | - | | 2.248 | 0.000 | 2.248 | - |
| Informaion Warfare Contract Award | TBD | MCSC : Quantico, VA | 0.000 | 0.000 | | 0.000 | | 2.000 | Feb 2019 | - | | 2.000 | 0.000 | 2.000 | - |
| Urban Engagement Systems Contract Award | TBD | MCSC : Quantico, VA | 0.000 | 0.000 | | 0.000 | | 1.000 | Feb 2019 | - | | 1.000 | 0.000 | 1.000 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 5.630 | | 5.878 | | - | | 5.878 | Continuing | Continuing | N/A |

**Remarks**

FY19 Product Development Autonomous Vehicles: effort will identify, prototype, and assess the use in a variety of combat and supporting use employments, vehicles capable of sensing their environment, while navigating and functioning independently without human conduction to take evasive or defensive action and avoid detection, tracking, targeting

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604320M / *Rapid Technology Capability Prototype* | **Project (Number/Name)**<br>0386 / *Rapid Prototype Development, Marine Corps* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

or attack, provide an alternative reconnoiter capability in non-permissive settings for the purpose of mapping and patrolling for the purpose of intensifying combat power and reducing risk to the force.

FY19 Product Development Tactical Information Warfare: effort will identify, prototype, and assess various informations systems that provide small unit ability to undermine local opposing force information quality, while ensuring friendly forces a timely, accurate, superior capability to automatically correlate relevant active and passive information from organic and non-organic sensors that will increase their combat effectiveness in this emerging warfighting discipline.

FY19 Product Development Urban Engagement Systems; efforts will identify, prototype and assess small unit systems to provide them enhanced situational awareness to locate and track opposing forces in tall buildings, narrow alleys, sewage tunnels and subway systems in order to minimize friendly force exposure, reduce potential collateral damage, and offer increased force protection measures by means of amplified lethality, improved discrimination ability, and enhances survivability.

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tactical EM | Various | Not Specified : Not Specified | 0.000 | 0.000 | | 0.425 | Jan 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Swarm | Various | Not Specified : Not Specified | 0.000 | 0.000 | | 0.425 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.425 | - |
| Fires | Various | Not Specified : Not Specified | 0.000 | 0.000 | | 0.200 | Apr 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Engineering Analysis and program office support | C/FFP | MCSC : Quantico, VA | 0.000 | 0.000 | | 0.000 | | 0.566 | Mar 2019 | - | | 0.566 | 0.000 | 0.566 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 1.050 | | 0.566 | | - | | 0.566 | Continuing | Continuing | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Autonomous Vehicles OPFOR Assessment | TBD | Yuma Proving Grounds : Yuma, AZ | 0.000 | 0.000 | | 0.000 | | 0.250 | Mar 2019 | - | | 0.250 | 0.000 | 0.250 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604320M / *Rapid Technology Capability Prototype* | Project (Number/Name)<br>0386 / *Rapid Prototype Development, Marine Corps* | |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Information Warfare OPFOR Assessment | TBD | Electronic Proving Ground (EPG) : Ft Huachuca, AZ | 0.000 | 0.000 | | 0.000 | | 0.263 | Mar 2019 | - | | 0.263 | 0.000 | 0.263 | - |
| Urban Engagement Systems OPFOR Assessment | C/BA | Muscatatuck : Bulerville, IN | 0.000 | 0.000 | | 0.000 | | 0.150 | Mar 2019 | - | | 0.150 | 0.000 | 0.150 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 0.663 | | - | | 0.663 | 0.000 | 0.663 | N/A |

**Remarks**

FY19 Operations Forces (OPFOR) Assessment Autonomous Vehicles: effort test prototypes, and assess the use in a variety of combat and supporting use employments, vehicles capable of sensing their environment, while navigating and functioning independently without human conduction to take evasive or defensive action and avoid detection, tracking, targeting or attack, provide an alternative reconnoiter capability in non-permissive settings for the purpose of mapping and patrolling for the purpose of intensifying combat power and reducing risk to the force.

FY19 OPFOR Assessment Information Warfare: effort will test prototypes, and assess various information systems that provide small unit ability to undermine local opposing force information quality, while ensuring friendly forces a timely, accurate, superior capability to automatically correlate relevant active and passive information from organic and non-organic sensors.

FY19 OPFOR Assessment Urban Engagement Systems; efforts will test prototypes on a state of the art urban range with appropriate buildings and streets that properly reflect an urban environment. Systems must locate and track opposing forces in tall buildings, narrow alleys, sewage tunnels and subway systems in order to minimize friendly force exposure, reduce potential collateral damage, and offer increased force protection.

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Engineering Analysis Services | WR | NSWC Crane : Crane, IN | 0.000 | 0.000 | | 0.150 | Nov 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Program office support | TBD | TBD : Not Specified | 0.000 | 0.000 | | 0.225 | Dec 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.375 | | 0.000 | | - | | 0.000 | Continuing | Continuing | N/A |

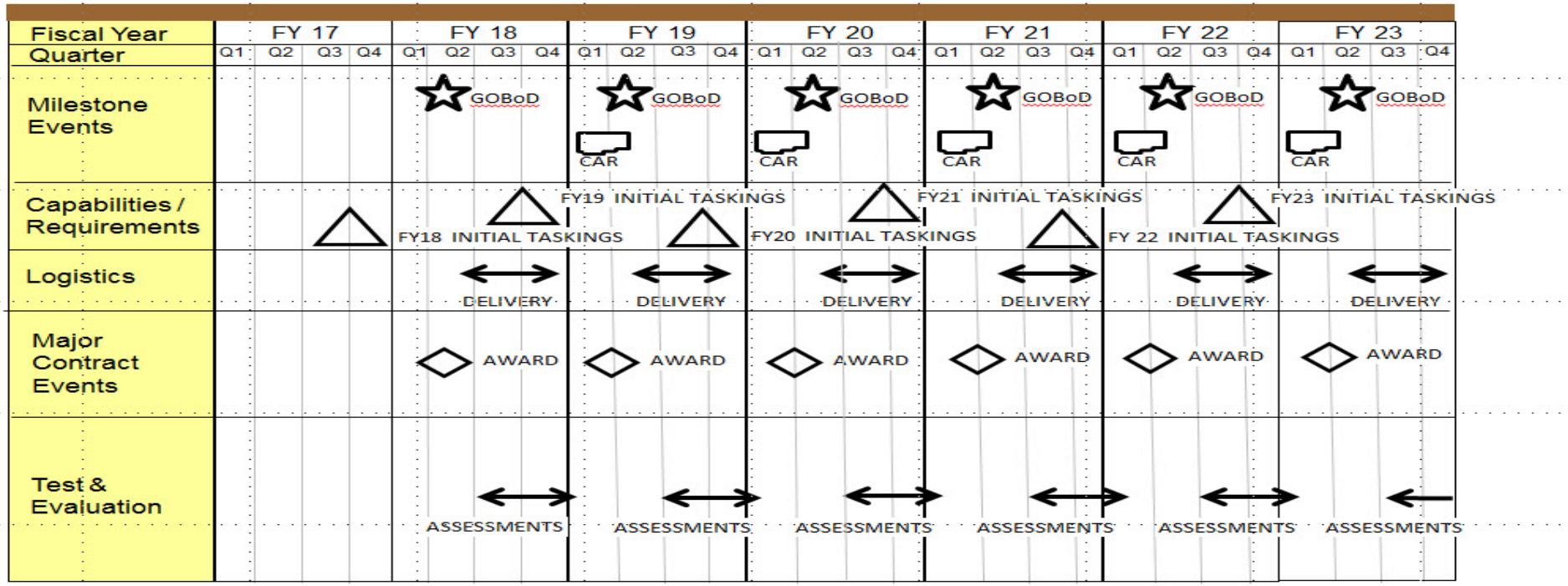
| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604320M / *Rapid Technology Capability Prototype* | Project (Number/Name)<br>0386 / *Rapid Prototype Development, Marine Corps* | |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 7.055 | | 7.107 | | - | | 7.107 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604320M / *Rapid Technology Capability Prototype* | **Project (Number/Name)**<br>0386 / *Rapid Prototype Development, Marine Corps* |

# RAPID PROTOTYPE DEVELOPMENT, MARINE CORPS
## (Marine Corps Rapid Capabilities Office)
## Program Schedule




ACRONYMS
CAR – Capability Assessment Report
GOBoD – General Officer Board of Directors
EMS – Electromagnetic Spectrum

KEY
GOBoD Decision
Documentation
Contract Action
Key Event
Assessments

FY 18 PROJECTS
Tactical EMS Operations
Autonomous Unmanned Swarming
Long-Range Precision Fires

FY 19 PROJECTS
Autonomous Vehicles
Tactical Information Warfare
Urban Engagement Systems

FY 20 – 23 PROJECTS
TBD

1

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604320M / *Rapid Technology Capability Prototype* | **Project (Number/Name)**<br>0386 / *Rapid Prototype Development, Marine Corps* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 0386*** | | | | |
| Contract Award | 2 | 2019 | 2 | 2019 |
| Prototype Deliveries | 2 | 2019 | 4 | 2019 |
| Operations Forces (OPFOR) Assessments | 2 | 2019 | 1 | 2020 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0604454N *I (U)LX (R)* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 105.914 | 24.730 | 9.578 | 5.549 | - | 5.549 | 12.694 | 12.530 | 3.240 | 3.313 | Continuing | Continuing |
| 2474: *LX(R) Design & Total Ship Integration* | 77.914 | 6.354 | 9.578 | 5.549 | - | 5.549 | 12.694 | 12.530 | 3.240 | 3.313 | Continuing | Continuing |
| 9999: *Congressional Adds* | 28.000 | 18.376 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 46.376 |
| **Program MDAP/MAIS Code:**<br>**Project MDAP/MAIS Code(s):** P461 | | | | | | | | | | | | |

**A. Mission Description and Budget Item Justification**

The FY 2019 funding request was reduced by $0.012 million to reflect the Department of Navy's effort to support the Office of Management and Budget directed reforms for Efficiency and Effectiveness that include a lean, accountable, more efficient government.

2474 - LX(R) is expected to functionally replace LSD-41 Class ships and LSD-49 Class ships for embark, transport, control, insert, sustainment, and extract of Marine Air-Ground Task Force elements and supporting forces by helicopters, landing craft, and amphibious vehicles. Efforts are required to identify viable alternatives, including examining a reduced cost variant of LPD-17 Class. Efforts include Gate and Milestone (MS) reviews/documentation, Capability Development Document (CDD), Indicative/Preliminary/Contract Design (ID/PD/CD), and development of logistics and Test & Evaluation documentation. Program is on track to support FY26 retirement of LSDs.

FY12-FY14 LX(R) efforts previously budgeted in PE 0603564N.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 6.354 | 9.578 | 5.657 | - | 5.657 |
| Current President's Budget | 24.730 | 9.578 | 5.549 | - | 5.549 |
| Total Adjustments | 18.376 | 0.000 | -0.108 | - | -0.108 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -0.624 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | -0.012 | - | -0.012 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -0.096 | - | -0.096 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | Date: February 2018 |
|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | R-1 Program Element (Number/Name)<br>PE 0604454N *I (U)LX (R)* | | |
| • Congressional Add Adjustments | 19.000 | - | - | - |

**Congressional Add Details ($ in Millions, and Includes General Reductions)**

| | FY 2017 | FY 2018 |
|---|---|---|
| **Project:** 9999: *Congressional Adds* | | |
| Congressional Add: *Accelerate LX(R)* | 18.376 | 0.000 |
| Congressional Add Subtotals for Project: 9999 | 18.376 | 0.000 |
| Congressional Add Totals for all Projects | 18.376 | 0.000 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604454N / *(U)LX (R)* | Project (Number/Name)<br>2474 / *LX(R) Design & Total Ship Integration* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2474: *LX(R) Design & Total Ship Integration* | 77.914 | 6.354 | 9.578 | 5.549 | - | 5.549 | 12.694 | 12.530 | 3.240 | 3.313 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Project MDAP/MAIS Code:** P461

**A. Mission Description and Budget Item Justification**

2474 - LX(R) is expected to functionally replace LSD-41 Class ships and LSD-49 Class ships for embark, transport, control, insert, sustainment, and extract of Marine Air-Ground Task Force elements and supporting forces by helicopters, landing craft, and amphibious vehicles. Efforts are required to identify viable alternatives, including examining a reduced cost variant of LPD-17 Class. Efforts include Gate and Milestone (MS) reviews/documentation, Capability Development Document (CDD), Indicative/Preliminary/Contract Design (ID/PD/CD), and development of logistics and Test & Evaluation documentation. Program is on track to support FY26 retirement of LSDs.

FY12-FY14 LX(R) efforts previously budgeted in PE 0603564N.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** LX(R) DESIGN/TOTAL SHIP INTEGRATION | 6.354 | 9.578 | 5.549 | 0.000 | 5.549 |
| ***Articles:*** | - | - | - | - | - |

***FY 2018 Plans:***
Continue affordability initiatives to identify additional savings to absorb the one year delay to Start of Construction. Complete, lock and approve a Technical Data Package that aligns with the established affordability targets. Develop the documentation for a Gate 5 Review to approve and release Detailed Design and Construction (DD&C) Request for Proposal (RFP). Finalize and issue TEMP for review and approval.

***FY 2019 Base Plans:***
Execute a Gate 5 Review to approve the release of the Detailed Design and Construction (DD&C) Request for Proposal (RFP). Release the RFP for DD&C with multiple follow ship contract options with an award value of more than $8 Billion. Analyze and respond to numerous shipbuilder bidders questions and conduct source selection activities to support a FY20 contract award. Conduct a peer review and conduct a program review decision meeting with the Milestone Decision Authority in support of contract award.

***FY 2019 OCO Plans:***
N/A

***FY 2018 to FY 2019 Increase/Decrease Statement:***

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604454N / *(U)LX (R)* | **Project (Number/Name)**<br>2474 / *LX(R) Design & Total Ship Integration* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Decrease of $4.029M from FY 2018 to FY 2019 is due to the shift in focus from affordability studies and Technical Data Package(TDP) development to the release of the DD&C RFP | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 6.354 | 9.578 | 5.549 | 0.000 | 5.549 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • 3010: *AMPHIBIOUS SHIP REPLACEMENT LX(R)* | 0.000 | 0.000 | 0.000 | - | 0.000 | 1,838.492 | 0.000 | 1,704.481 | 1,738.892 | 0.000 | 5,281.865 |

**Remarks**

**D. Acquisition Strategy**

Predecisional, competition will be part of the acquisition strategy.

**E. Performance Metrics**

Performance metrics are included in the CDD.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604454N / *(U)LX (R)* | Project (Number/Name)<br>2474 / *LX(R) Design & Total Ship Integration* | |

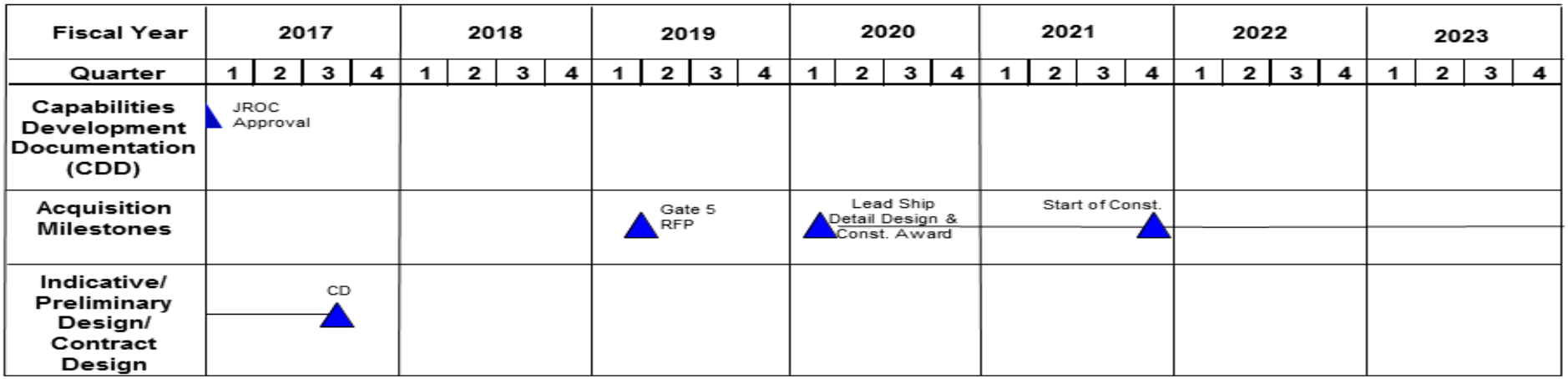
**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Design/Systems Integration | C/CPIF | CSC, Alion, ICI : Washington, DC | 24.562 | 1.361 | Dec 2016 | 3.144 | Jan 2018 | 1.847 | Nov 2018 | - | | 1.847 | Continuing | Continuing | Continuing |
| Design/Systems Integration | WR | NSWC Carderock/ SSES Philadelphia : NSWC Beth, MD/ SSES Philadelphia, PA | 15.047 | 3.475 | Nov 2016 | 3.078 | Jan 2018 | 1.809 | Oct 2018 | - | | 1.809 | Continuing | Continuing | Continuing |
| Design/Systems Integration | WR | NSWC Dahlgren : Dahlgren, VA | 1.712 | 0.165 | Nov 2016 | 0.707 | Jan 2018 | 0.415 | Oct 2018 | - | | 0.415 | Continuing | Continuing | Continuing |
| Design/Systems Integration | WR | PEO C4I, PEO IWS : Washington, DC | 4.450 | 0.244 | Nov 2016 | 1.670 | Jan 2018 | 0.982 | Oct 2018 | - | | 0.982 | Continuing | Continuing | Continuing |
| Design/Systems Integration | WR | NAWC Lakehurst : Lakehurst, NJ | 0.899 | 0.298 | Nov 2016 | 0.404 | Jan 2018 | 0.193 | Oct 2018 | - | | 0.193 | Continuing | Continuing | Continuing |
| Design/Systems Integration | C/BA | NSWC, Panama City : Panama City, FL | 0.725 | 0.125 | Nov 2016 | 0.275 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 1.125 | - |
| Design/Systems Integration | WR | NSWC, Port Hueneme : Port Hueneme, CA | 0.628 | 0.220 | Nov 2016 | 0.300 | Jan 2018 | 0.122 | Oct 2018 | - | | 0.122 | Continuing | Continuing | Continuing |
| Design/Systems Integration | C/CPFF | HII, General Dynamics : Various | 29.891 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Design/Systems Integration | WR | NAVSEALOGCEN : Mechanicsburg, PA | 0.000 | 0.466 | Dec 2016 | 0.000 | | 0.181 | Oct 2018 | - | | 0.181 | 0.000 | 0.647 | - |
| | | **Subtotal** | 77.914 | 6.354 | | 9.578 | | 5.549 | | - | | 5.549 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 77.914 | 6.354 | | 9.578 | | 5.549 | | - | | 5.549 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604454N / *(U)LX (R)* | **Project (Number/Name)**<br>2474 / *LX(R) Design & Total Ship Integration* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604454N / *(U)LX (R)* | **Project (Number/Name)**<br>2474 / *LX(R) Design & Total Ship Integration* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 2474*** | | | | |
| Capabilities Development Documentation (CDD) | 1 | 2017 | 1 | 2017 |
| Indicative/Preliminary Design/Contract Design | 1 | 2017 | 3 | 2017 |
| Gate 5 | 1 | 2019 | 1 | 2019 |
| RFP Release Decision Point | 1 | 2019 | 1 | 2019 |
| Lead Ship Detail Design & Construction Award | 1 | 2020 | 1 | 2020 |
| Lead Ship Start of Construction | 4 | 2021 | 4 | 2021 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604454N / *(U)LX (R)* | Project (Number/Name)<br>9999 / *Congressional Adds* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9999: *Congressional Adds* | 28.000 | 18.376 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 46.376 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

FY17 Congressional Add to accelerate LX(R)

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2017 | FY 2018 |
|---|---|---|
| ***Congressional Add:*** Accelerate LX(R) | 18.376 | 0.000 |
| ***FY 2017 Accomplishments:*** The Capabilities Development Document (CDD) was approved by the Joint Requirements Oversight Council (JROC) in early FY 2017, which has further informed the development of the ship specification. Continue and complete Contract Design, which requires subsystem level of detail and most significantly a design that supports the development of a specification/documentation for a Gate 4, Gate 5 and Requirement Decision Point. Began early Operational Assessment discussions and development of a draft Test and Evaluation Master Plan(TEMP).<br>***FY 2018 Plans:*** N/A | | |
| **Congressional Adds Subtotals** | 18.376 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • 3010: *AMPHIBIOUS SHIP REPLACEMENT LX(R)* | 0.000 | 0.000 | 0.000 | - | 0.000 | 1,838.492 | 0.000 | 1,704.481 | 1,738.892 | 0.000 | 5,281.865 |

**Remarks**

**D. Acquisition Strategy**

Predecisional, competition will be part of the acquisition strategy.

**E. Performance Metrics**

Predecisional, performance metrics will be developed in parallel with the CDD.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604454N / *(U)LX (R)* | **Project (Number/Name)**<br>9999 / *Congressional Adds* |

**Product Development ($ in Millions)**

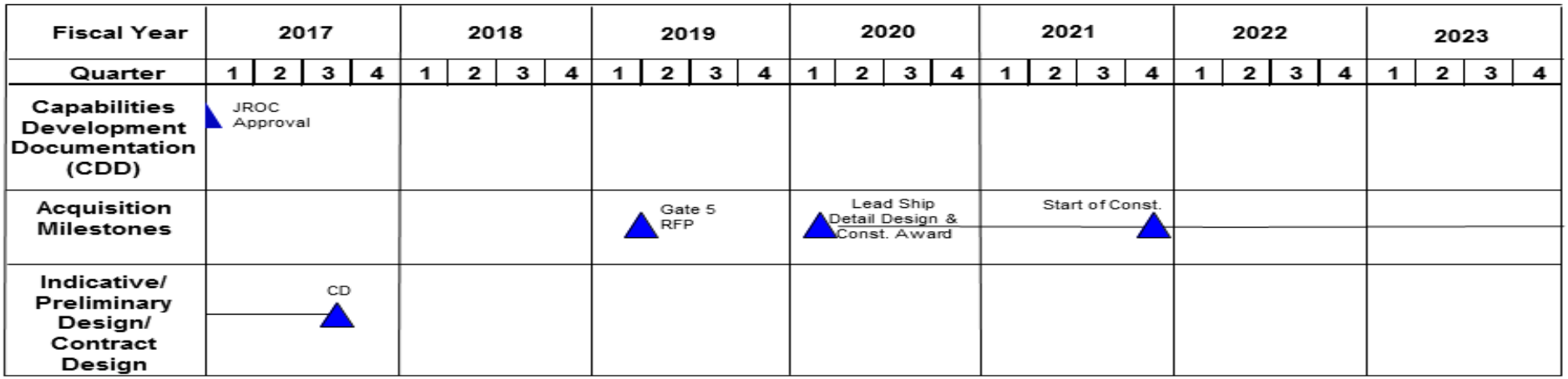
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Design/Systems Integration | C/CPIF | CSC, Alion, ICI : Washington, DC | 0.444 | 6.920 | Aug 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 7.364 | - |
| Design/Systems Integration | WR | NSWC Carderock/ SSES Philadelphia : Bethesda, MD/ Philadelphia, PA | 3.400 | 7.262 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 10.662 | - |
| Design/Systems Integration | WR | NSWC, Dahlgren : Dahlgren, VA | 0.000 | 1.100 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.100 | - |
| Design/Systems Integration | WR | PEO C4I, PEO IWS : Washington, DC | 0.767 | 1.353 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.120 | - |
| Design/Systems Integration | WR | NAWC Lakehurst : Lakehurst, NJ | 0.100 | 0.154 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.254 | - |
| Design/Systems Integration | C/CPFF | HII, General Dynamics : Various | 23.047 | 1.094 | Aug 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 24.141 | - |
| Design/Systems Integration | WR | NAVSEALOGCEN : Mechanicsburg, PA | 0.242 | 0.325 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.567 | - |
| Design/Systems Integration | WR | NSWC Port Hueneme : Port Hueneme, CA | 0.000 | 0.168 | Jul 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.168 | - |
| | | **Subtotal** | 28.000 | 18.376 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 46.376 | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 28.000 | 18.376 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 46.376 | N/A |

**Remarks**

FY 2017 funding is to address Congressional Intent for acceleration efforts

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604454N / *(U)LX (R)* | **Project (Number/Name)**<br>9999 / *Congressional Adds* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604454N / *(U)LX (R)* | **Project (Number/Name)**<br>9999 / *Congressional Adds* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 9999*** | | | | |
| Capabilities Development Documentation (CDD) | 1 | 2017 | 1 | 2017 |
| Indicative/Preliminary Design/Contract Design | 1 | 2017 | 3 | 2017 |
| Gate 5 | 1 | 2019 | 1 | 2019 |
| RFP Release Decision Point | 1 | 2019 | 1 | 2019 |
| Lead Ship Detail Design & Construction Award | 1 | 2020 | 1 | 2020 |
| Lead Ship Start of Construction | 4 | 2021 | 4 | 2021 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0604536N *I (U)Advanced Undersea Prototyping* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 0.000 | 57.363 | 66.543 | 87.669 | - | 87.669 | 95.267 | 85.413 | 40.085 | 33.686 | Continuing | Continuing |
| 3393: *Adv Undersea Prototyping-Remote Command & Control* | 0.000 | 1.486 | 2.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 3.486 |
| 3394: *Adv Undersea Prototyping-Vehicles, Propulsion & Navigation* | 0.000 | 38.789 | 61.512 | 87.669 | - | 87.669 | 95.267 | 85.413 | 40.085 | 33.686 | Continuing | Continuing |
| 3395: *Adv Undersea Prototyping-Explosive Payloads* | 0.000 | 1.220 | 2.014 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 3.234 |
| 3396: *Adv Undersea Prototyping-Non-Lethal Payloads* | 0.000 | 0.500 | 1.017 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.517 |
| 9999: *Congressional Adds* | 0.000 | 15.368 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 15.368 |

**Note**

FY 2019 and future funding for Projects 3393, 3395 and 3396 are in Program Element (PE) 0604029N. These three projects realigned from PE 0604536N starting in FY 2019 included $4.385 million reduction to account for the availability of prior year execution balances.

The current FY 2019 funding request for project 3394 was reduced by $3.775 million to account for the availability of prior year execution balances.

**A. Mission Description and Budget Item Justification**

In order to accelerate future capability and support steady growth of the fleet's Unmanned Undersea Vehicle (UUV) Family of Systems (FoS), advanced undersea prototyping efforts include development, fabrication and test of the ORCA Extra Large Unmanned Undersea Vehicles (XLUUVs) and associated UUV technologies and will advance the development of unmanned undersea vehicles systems by leveraging ONR and Industry UUV efforts for larger diameter vehicles and associated technologies. Payloads will be customized to meet Navy needs and demonstrate useful capability for the fleet. The program intends to utilize fleet demonstrations of existing XLUUVs to rapidly and affordably capture tactics, techniques, and procedures in operating XLUUVs prior to delivery of the initial XLUUV vehicles to the fleet. This will help develop experience and demonstrate launch, communications, command and control, navigation, endurance, recovery, payload feasibility, and mission planning and execution for XLUUVs. XLUUV energy prototyping will leverage existing independent research and development in energy-dense technology that could meet power requirements for future XLUUV missions that are limited by the amount of power currently available. Efforts include research, development, test, and evaluation of advanced development model energy solutions applicable to XLUUVs for increased energy endurance and efficiency to extend the reach of unmanned undersea systems. The Common Control/Autonomy efforts will include risk reduction and developmental efforts of autonomy systems and architectures to work to develop common standards, interfaces, and systems to support cross-domain applications. The payloads efforts will include investigation, experimentation, demonstration, development and integration of lethal and non-lethal payloads, as applicable.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0604536N *I (U)Advanced Undersea Prototyping* |

Beginning in FY19, this PE will only focus on the XLUUV Class of vehicles since the core technologies efforts were moved to PE 0604029N starting in FY19.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 78.589 | 66.543 | 106.568 | - | 106.568 |
| Current President's Budget | 57.363 | 66.543 | 87.669 | - | 87.669 |
| Total Adjustments | -21.226 | 0.000 | -18.899 | - | -18.899 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -2.115 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | -9.755 | - | -9.755 |
| • Rate/Misc Adjustments | -0.001 | 0.000 | -9.144 | - | -9.144 |
| • Congressional Directed Reductions Adjustments | -35.000 | - | - | - | - |
| • Congressional Add Adjustments | 15.890 | - | - | - | - |

| Congressional Add Details ($ in Millions, and Includes General Reductions) | FY 2017 | FY 2018 |
|---|---|---|
| **Project:** 9999: *Congressional Adds* | | |
| Congressional Add: *Program Increase* | 15.368 | 0.000 |
| Congressional Add Subtotals for Project: 9999 | 15.368 | 0.000 |
| Congressional Add Totals for all Projects | 15.368 | 0.000 |

**Change Summary Explanation**

Program Changes:
FY17: -$21,219K: -$35,000K Congressional Reduction, +$15,890K Congressional Add for AUWP, -$2,115K SBIR/STTR Reduction, -$1K Miscellaneous Adjustments.
FY18: Not applicable.
FY19: -$18,899K; +$20,432K Internal Program realignment, -$30,187K technical realignment to new PE, -$984K miscellaneous adjustments and -$8,160K underexecution.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0604536N *I (U)Advanced Undersea Prototyping* |

Technical: Not applicable.

Schedule: Not applicable.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | Project (Number/Name)<br>3393 / *Adv Undersea Prototyping-Remote Command & Control* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3393: *Adv Undersea Prototyping-Remote Command & Control* | 0.000 | 1.486 | 2.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 3.486 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

FY 2019 and future funding for Project 3393 is in Program Element (PE) 0604029N. Project realigned from PE 0604536N starting in FY 2019.

**A. Mission Description and Budget Item Justification**

Advanced Undersea energy efforts will leverage existing independent research and development in energy-dense technology that could meet power requirements for Unmanned Undersea Vehicle (UUV) missions, which are limited by the amount of power that they can carry. Efforts under this program element include research, development, test, and evaluation
of advanced energy solutions initally applicable to XLUUVs for increased energy endurance and efficiency to extend the reach of unmanned undersea systems. The Common Control/Autonomy portion of this project funds risk reduction and developmental efforts of autonomy systems and architectures to work to develop common standards, interfaces,
and systems to support cross-domain applications. This includes advanced development prototyping and demonstrations to accelerate the design and development of commonality and interoperability capabilities for the cross-domain (Surface and Sub-Surface, Aviation and Ground) requirements of the Navy. Coordinating with the Common Control System where
applicable, these efforts will demonstrate scalable, adaptable and interoperable warfighting capabilities across various unmanned systems. The advanced development emphasis will be to encourage innovation and enable rapid integration of UxS capabilities across domains while working to develop common standards, interfaces, and systems. These efforts will define, develop and demonstrate capability that advance new technology, hardware and software of Control Systems that could be used to operate multiple and dissimilar Naval UxSs. Supports Advanced Development and Prototyping of PE 0305205N: UAS Integration and Interoperability.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Product Development | 1.300 | 1.460 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Energy: Perform systems engineering and begin design of energy prototype components that leverage existing independent<br>research and development in energy-dense technology to meet power requirements for XLUUV missions. Continue early | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | **Project (Number/Name)**<br>3393 / *Adv Undersea Prototyping-Remote Command & Control* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| component and Advanced Development Model system prototype development. Conduct Preliminary Design Review (PDR).<br><br>Autonomy: Continue requirements development and development of Architecture Standards. Continue early efforts for Total Common Control System (CCS).<br>***FY 2019 Base Plans:***<br>FY 2019 funding in Program Element (PE) 0604029N.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Project realigned to PE 0604029N from PE 0604536N starting in FY 2019. | | | | | |
| ***Title:*** Support<br>***Articles:***<br>***FY 2018 Plans:***<br>Energy: Update program documentation as required and support efforts. Autonomy: Update documentation and work on development of common autonomy standards, interfaces, and systems. Update CCS documentation based<br>on domain requirements analyses.<br>***FY 2019 Base Plans:***<br>FY 2019 funding in Program Element (PE) 0604029N.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Project realigned to PE 0604029N from PE 0604536N starting in FY 2019. | 0.093<br>- | 0.390<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- |
| ***Title:*** Management<br>***Articles:***<br>***FY 2018 Plans:***<br>Energy: Provide guidance, project planning, financial and contracting support, and coordination between prototype | 0.093<br>- | 0.150<br>- | 0.000<br>- | 0.000<br>- | 0.000<br>- |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | **Project (Number/Name)**<br>3393 / *Adv Undersea Prototyping-Remote Command & Control* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| developer, test support, engineering, and contractors. Autonomy: Provide guidance, project planning, financial and<br>contracting support, and coordination for development of common autonomy standards, interfaces, and systems, and<br>common control efforts.<br>***FY 2019 Base Plans:***<br>FY 2019 funding in Program Element (PE) 0604029N.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Project realigned to PE 0604029N from PE 0604536N starting in FY 2019. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 1.486 | 2.000 | 0.000 | 0.000 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Design Advanced Energy components to reach Preliminary Design Review in FY18. Develop and build advanced energy prototype and integrate system when ready. Test advanced energy prototype starting in FY21. Develop requirements, standards, interfaces, and architecture for Autonomy and Common Control System (CCS) unmanned system software
components to support common prototyping and experimentation. Design and develop CCS unmanned system software components for common cross domain prototyping and system integration with surrogate systems starting in FY22. Coordination with UxS platforms will eliminate redundant efforts, encourage innovation, and improve coordination of
unmanned systems across multiple domains. Schedules were updated to align with updated funding profiles.
Leveraging the available applicable portions of the Common Control System (CCS) capabilities and products, the effort will work to reduce risk with advanced development efforts across Naval operating domains. The advanced energy efforts will leverage resources and prototype expertise to encourage industry innovation and allow for rapid integration into
unmanned systems. Coordinate with other UxS Programs and Systems on the development of UUV autonomy standards, architectures, and systems, defining and focusing autonomy efforts. Develop algorithms and models and simulations for testing autonomy that could be inserted into UUVs.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | **Project (Number/Name)**<br>3393 / *Adv Undersea Prototyping-Remote Command & Control* |

**E. Performance Metrics**

Demonstrate use of advanced UUV Energy technology in an Advanced Development Model prototype. Demonstrate CCS & autonomy software through surrogate systems.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | **Project (Number/Name)**<br>3393 / *Adv Undersea Prototyping-Remote Command & Control* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Energy Prototype Contract | SS/CPFF | ARL PSU : State College, PA | 0.000 | 0.600 | Jul 2017 | 0.677 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 1.277 | Continuing |
| Common Control System (CCS) Cross-Domain Architecture Development | Various | Various : Various | 0.000 | 0.200 | Jul 2017 | 0.370 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.570 | Continuing |
| Autonomy | Various | Various : Various | 0.000 | 0.500 | Jul 2017 | 0.413 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.913 | Continuing |
| | | **Subtotal** | 0.000 | 1.300 | | 1.460 | | 0.000 | | - | | 0.000 | 0.000 | 2.760 | N/A |

**Remarks**

FY 2019 and future funding for Project 3393 is in Program Element (PE) 0604029N.

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Energy Prototype Engineering Support 1 | SS/CPFF | ARL PSU : State College, PA | 0.000 | 0.035 | Aug 2017 | 0.152 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.187 | Continuing |
| Auontomy Support | Various | NAVSEA Activities : Washington, DC | 0.000 | 0.020 | Jul 2017 | 0.135 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.155 | Continuing |
| Common Control System (CCS) Engineering Support | Various | Various : Various | 0.000 | 0.038 | Jul 2017 | 0.103 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.141 | Continuing |
| | | **Subtotal** | 0.000 | 0.093 | | 0.390 | | 0.000 | | - | | 0.000 | 0.000 | 0.483 | N/A |

**Remarks**

FY 2019 and future funding for project 3393 is in Program Element (PE) 0604029N

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | **Project (Number/Name)**<br>3393 / *Adv Undersea Prototyping-Remote Command & Control* |

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Energy Prototype Management | Various | Various : Various | 0.000 | 0.035 | Jul 2017 | 0.050 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.085 | Continuing |
| Autonomy | Various | NAVSEA Activities : Washington, DC | 0.000 | 0.020 | Jul 2017 | 0.050 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.070 | Continuing |
| Common Control System (CCS) | Various | NAVAIR : Pax River, MD | 0.000 | 0.038 | Jul 2017 | 0.050 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.088 | Continuing |
| | | **Subtotal** | 0.000 | 0.093 | | 0.150 | | 0.000 | | - | | 0.000 | 0.000 | 0.243 | N/A |

**Remarks**

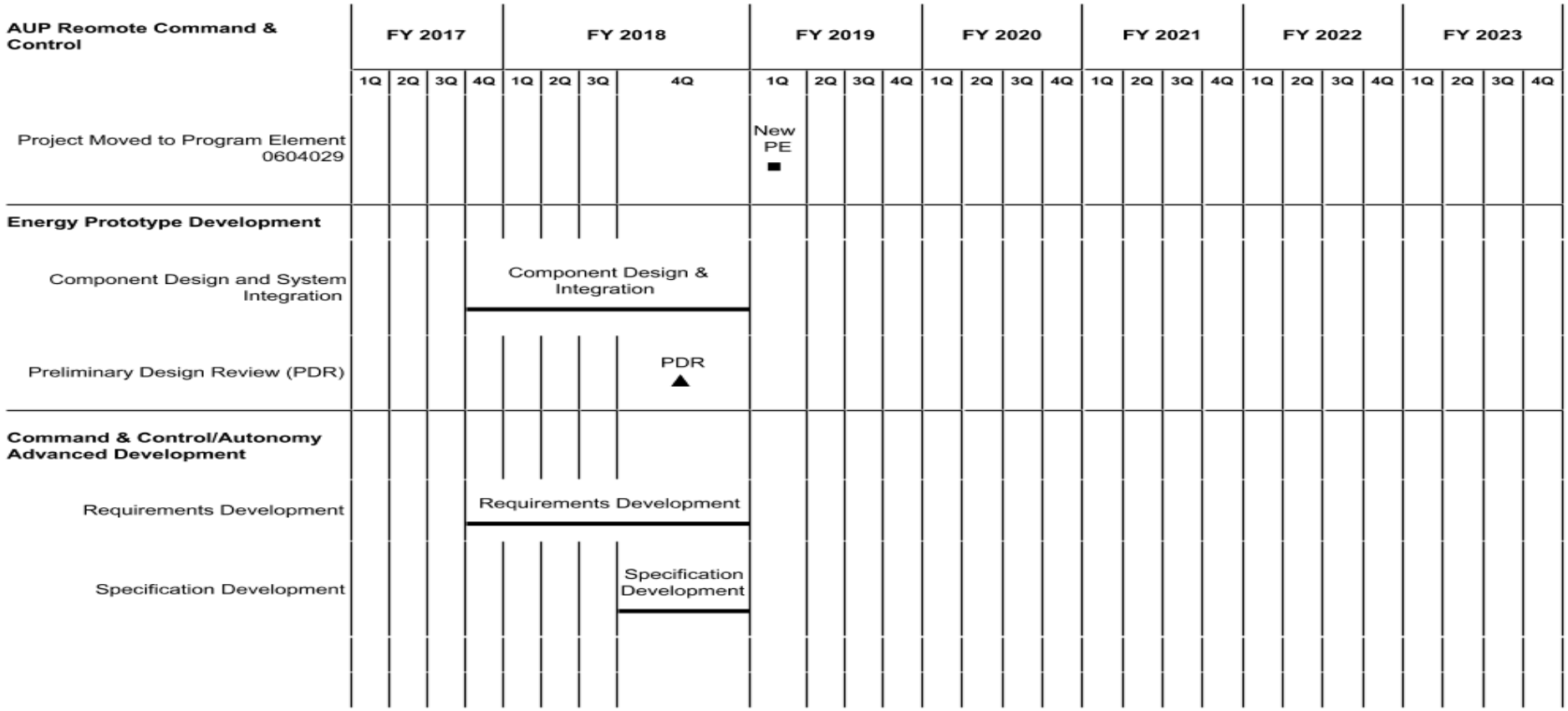
FY 2019 and future funding for Project 3393 is in Program Element (PE) 0604029N.

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 1.486 | | 2.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.486 | N/A |

**Remarks**

FY 2019 and future funding for Project 3393 is in Program Element (PE) 0604029N.

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | **Project (Number/Name)**<br>3393 / *Adv Undersea Prototyping-Remote Command & Control* |




*2019PB - 0604536N - 3393*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | **Project (Number/Name)**<br>3393 / *Adv Undersea Prototyping-Remote Command & Control* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***AUP Reomote Command & Control*** | | | | |
| Project Moved to Program Element 0604029: Schedule Detail | 1 | 2019 | 1 | 2019 |
| Energy Prototype Development: Component Design and System Integration: Component Design and System Integration | 4 | 2017 | 4 | 2018 |
| Energy Prototype Development: Preliminary Design Review (PDR): Preliminary Design Reveiw (PDR) | 4 | 2018 | 4 | 2018 |
| Command & Control/Autonomy Advanced Development: Requirements Development: Requirements Development | 4 | 2017 | 4 | 2018 |
| Command & Control/Autonomy Advanced Development: Specification Development: Specification Development | 4 | 2018 | 4 | 2018 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | Project (Number/Name)<br>3394 / *Adv Undersea Prototyping-Vehicles, Propulsion & Navigation* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3394: *Adv Undersea Prototyping-Vehicles, Propulsion & Navigation* | 0.000 | 38.789 | 61.512 | 87.669 | - | 87.669 | 95.267 | 85.413 | 40.085 | 33.686 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

The FY 2019 funding request was reduced by $3.775 million to account for the availability of prior year execution balances

**A. Mission Description and Budget Item Justification**

Advanced undersea prototyping efforts include development, fabrication and test of ORCA Extra Large Unmanned Undersea Vehicle Systems (XLUUVs) and will advance the development of unmanned undersea vehicles by leveraging Commercial Off The Shelf (COTS) XLUUVs (normally greater than 54 inches in diameter). Payloads will be customized to meet Navy needs and demonstrate useful capability for the fleet. The program will utilize fleet demonstrations of existing XLUUVs to rapidly and affordably capture tactics, techniques, and procedures in operating XLUUVs prior to delivery of the initial XLUUV vehicles to the fleet. This will help develop experience and demonstrate launch, communications, command and control, navigation, endurance, recovery, payload feasibility, and mission planning and execution for XLUUVs.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** XLUUV Product Development | 35.338 | 52.822 | 77.577 | 0.000 | 77.577 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** ORCA XLUUV is being developed via a full and open competition to two industry teams to design systems (with down select to one team to fabricate). | | | | | |
| ***FY 2018 Plans:*** Execute two industry teams designing ORCA XLUUV, conduct System Requirements Review (SRR), Preliminary Design Review (PDR) and Critical Design Review preps. Lease Commercial Off the Shelf (COTS) UUVs to develop Tactics, Techniques and Procedures (TTPs). Order Long-lead material to support fabrication starting in FY19. | | | | | |
| ***FY 2019 Base Plans:*** Complete design efforts and conduct Critical Design Reviews (CDR) early in FY19 for both industry teams. Conduct down select to one industry partner (possibly keep both) and award contract for fabrication of up to | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | **Project (Number/Name)**<br>3394 / *Adv Undersea Prototyping-Vehicles, Propulsion & Navigation* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| five (5) XLUUVs. Begin XLUUV vehicle fabrication, including procurement of remaining materials (long lead materials previously procured in FY18) and initial assembly and integration of the first vehicles. Continue to lease Commercial Off the Shelf (COTS) UUVs to develop Tactics, Techniques and Procedures (TTPs).<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2019 increase in funding supports commencing XLUUV system fabrication. | | | | | |
| ***Title:*** XLUUV Support<br>***Articles:***<br>***FY 2018 Plans:***<br>Support management of up to two industry teams to design ORCA XLUUV. Support overseeing COTS leasing.<br>***FY 2019 Base Plans:***<br>Support finishing design and conduct the down select source selection process to one team for fabrication of XLUUV<br>vehicles. Support overseeing fabrication efforts. Support overseeing of COTS leasing.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2019 increase in funding supports fabrication award and oversight. | 2.623<br>- | 4.860<br>- | 6.110<br>- | 0.000<br>- | 6.110<br>- |
| ***Title:*** XLUUV Management Services<br>***Articles:***<br>***FY 2018 Plans:***<br>Provide technical guidance, project planning, program management and travel for XLUUV prototyping, financial and contracting support, and coordinate work with Fleet, test support, engineering support, and contractors.<br>***FY 2019 Base Plans:***<br>Provide technical guidance, project planning, program management and travel for XLUUV prototyping, financial and contracting support, and coordinate work with Fleet, test support, engineering support, and contractors.<br>***FY 2019 OCO Plans:*** | 0.828<br>- | 3.830<br>- | 3.982<br>- | 0.000<br>- | 3.982<br>- |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | **Project (Number/Name)**<br>3394 / *Adv Undersea Prototyping-Vehicles, Propulsion & Navigation* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2019 increase in funding supports fabrication award and oversight. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 38.789 | 61.512 | 87.669 | 0.000 | 87.669 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Up to five ORCA XLUUV systems will be designed and fabricated for demonstration and use in both CONUS and in the PACOM theater. Payloads developed under projects 3395 and 3396 will be integrated onto these vehicles to be included in fleet experimentation throughout the program to gain experience and develop CONOPS and TTPs. In addition, program will
lease Commercial Off The Shelf (COTS) XLUUVs for initial fleet demonstrations in FY18 and FY19. Two design contracts for the XLUUV system were awarded in FY 2017 with the option to down select to one contractor for fabrication in 1QFY19. Initial long-lead material will be ordered in FY18.

**E. Performance Metrics**

Successfully demonstrate ORCA XLUUV with Fleet.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | Project (Number/Name)<br>3394 / *Adv Undersea Prototyping-Vehicles, Propulsion & Navigation* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Payload Design documentation | C/CPIF | Various : Various | 0.000 | 0.085 | Jul 2017 | 2.440 | Nov 2017 | 1.290 | Nov 2018 | - | | 1.290 | Continuing | Continuing | Continuing |
| Design, Material, and Fabrication of up to 5 XLUUVs, including sub-systems | C/CPIF | Various : Various | 0.000 | 35.253 | Sep 2017 | 50.382 | Jan 2018 | 76.287 | Dec 2018 | - | | 76.287 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 35.338 | | 52.822 | | 77.577 | | - | | 77.577 | Continuing | Continuing | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RFP/PSPED Dev | SS/CPFF | APL/JHU : Laurel, MD | 0.000 | 0.300 | Aug 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.300 | - |
| Source Selection | WR | NSWC CD : Carderock, MD | 0.000 | 1.090 | Aug 2017 | 0.000 | | 0.427 | Nov 2018 | - | | 0.427 | Continuing | Continuing | Continuing |
| Source Selection | WR | SSC PAC : San Diego, CA | 0.000 | 0.205 | Aug 2017 | 0.000 | | 0.312 | Nov 2018 | - | | 0.312 | Continuing | Continuing | Continuing |
| Oversight of Efforts | Various | VAR : Various | 0.000 | 1.028 | Aug 2017 | 4.860 | Mar 2018 | 5.371 | Nov 2018 | - | | 5.371 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 2.623 | | 4.860 | | 6.110 | | - | | 6.110 | Continuing | Continuing | N/A |

**Management Services ($ in Millions)**

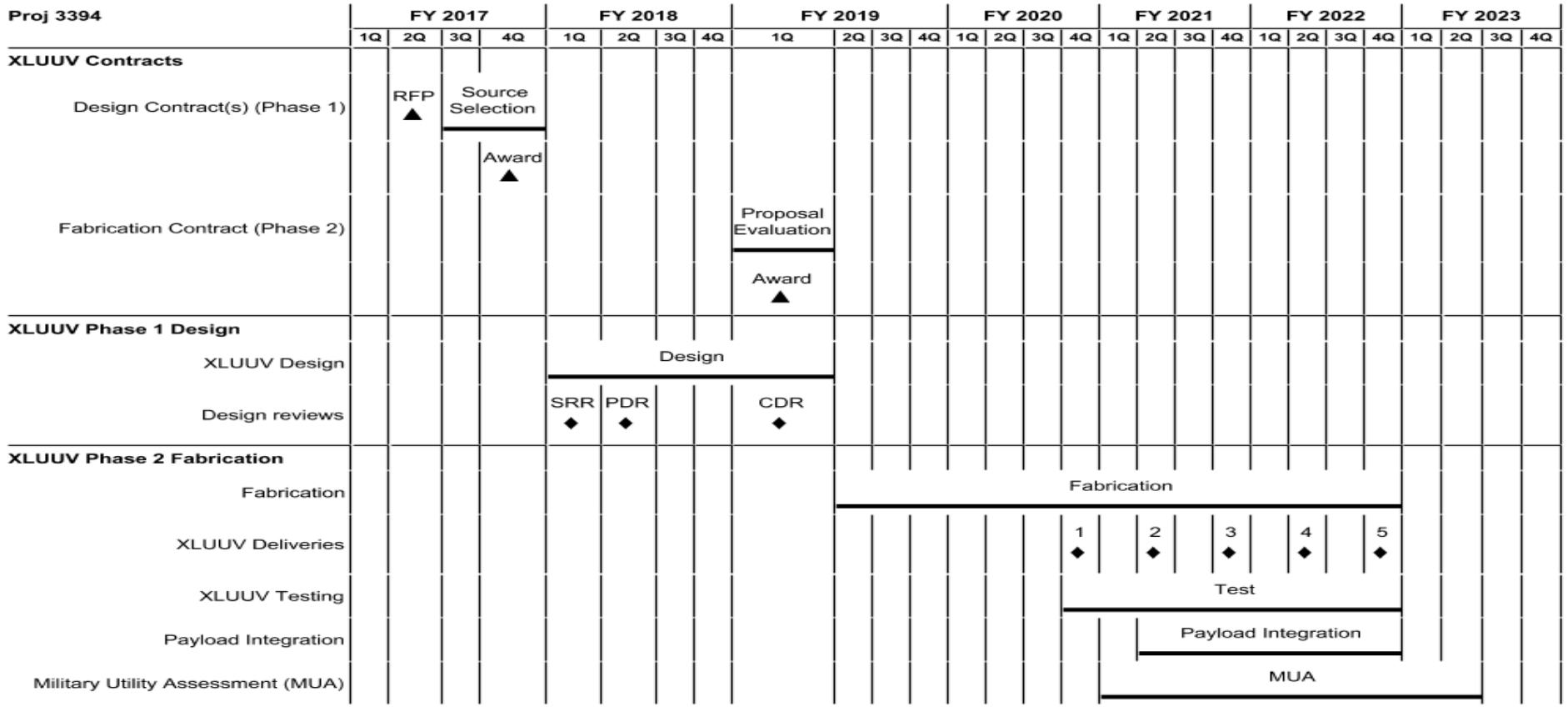
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mgmt & Techncal Efforts | WR | NAVSEA Activities : WASHINGTON, D.C. | 0.000 | 0.828 | Jun 2017 | 3.830 | Oct 2017 | 3.982 | Nov 2018 | - | | 3.982 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.828 | | 3.830 | | 3.982 | | - | | 3.982 | Continuing | Continuing | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | Project (Number/Name)<br>3394 / *Adv Undersea Prototyping-Vehicles, Propulsion & Navigation* | |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 38.789 | | 61.512 | | 87.669 | | - | | 87.669 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | **Project (Number/Name)**<br>3394 / *Adv Undersea Prototyping-Vehicles, Propulsion & Navigation* |




*2019PB - 0604536N - 3394*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | **Project (Number/Name)**<br>3394 / *Adv Undersea Prototyping-Vehicles, Propulsion & Navigation* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3394*** | | | | |
| XLUUV Contracts: Design Contract(s) (Phase 1): RFP | 2 | 2017 | 2 | 2017 |
| XLUUV Contracts: Design Contract(s) (Phase 1): Source Selection | 3 | 2017 | 4 | 2017 |
| XLUUV Contracts: Design Contract(s) (Phase 1): Contract Award | 4 | 2017 | 4 | 2017 |
| XLUUV Contracts: Fabrication Contract (Phase 2): Proposal Evaluation | 1 | 2019 | 1 | 2019 |
| XLUUV Contracts: Fabrication Contract (Phase 2): Contract Award | 1 | 2019 | 1 | 2019 |
| XLUUV Phase 1 Design: XLUUV Design: Design | 1 | 2018 | 1 | 2019 |
| XLUUV Phase 1 Design: Design reviews: SRR | 1 | 2018 | 1 | 2018 |
| XLUUV Phase 1 Design: Design reviews: PDR | 2 | 2018 | 2 | 2018 |
| XLUUV Phase 1 Design: Design reviews: CDR | 1 | 2019 | 1 | 2019 |
| XLUUV Phase 2 Fabrication: Fabrication: Fabrication | 2 | 2019 | 4 | 2022 |
| XLUUV Phase 2 Fabrication: XLUUV Deliveries: Delivery System 1 | 4 | 2020 | 4 | 2020 |
| XLUUV Phase 2 Fabrication: XLUUV Deliveries: Delivery System 2 | 2 | 2021 | 2 | 2021 |
| XLUUV Phase 2 Fabrication: XLUUV Deliveries: Delivery System 3 | 4 | 2021 | 4 | 2021 |
| XLUUV Phase 2 Fabrication: XLUUV Deliveries: Delivery System 4 | 2 | 2022 | 2 | 2022 |
| XLUUV Phase 2 Fabrication: XLUUV Deliveries: Delivery System 5 | 4 | 2022 | 4 | 2022 |
| XLUUV Phase 2 Fabrication: XLUUV Testing: Test | 4 | 2020 | 4 | 2022 |
| XLUUV Phase 2 Fabrication: Payload Integration: Integration | 2 | 2021 | 4 | 2022 |
| XLUUV Phase 2 Fabrication: Military Utility Assessment (MUA): Schedule Detail | 1 | 2021 | 2 | 2023 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | Project (Number/Name)<br>3395 / *Adv Undersea Prototyping-Explosive Payloads* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3395: *Adv Undersea Prototyping-Explosive Payloads* | 0.000 | 1.220 | 2.014 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 3.234 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

FY 2019 and future funding for project 3393 is in Program Element (PE) 0604029N. Project moved from PE 0604536N starting in FY 2019.

**A. Mission Description and Budget Item Justification**

Advanced undersea prototyping of undersea explosive payloads from XL sized UUVs. Leveraging the developments at ONR and other activities for undersea weapons, work to complete analysis of feasibility, policy, lethality, and performance of integrating undersea weapons systems on XLUUVs. The program will design new hardware, investigate and develop new
interfaces/systems to increase lethality in both the undersea and surface targets. New C2 algorithms will be developed for advanced targeting.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Explosive Payloads | 1.220 | 2.014 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Conduct concept design for XLUUV undersea weapons payload and performance and lethality analysis. Begin development of XLUUV interfaces for undersea weapons payloads. | | | | | |
| ***FY 2019 Base Plans:***<br>FY 2019 funding in Program Element (PE) 0604029N. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Project moved from PE 0604536N starting in FY 2019. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 1.220 | 2.014 | 0.000 | 0.000 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | **Project (Number/Name)**<br>3395 / *Adv Undersea Prototyping-Explosive Payloads* |

**C. Other Program Funding Summary ($ in Millions)**

**Remarks**

**D. Acquisition Strategy**

Leverage the knowledge base at the Naval Research and Development Enterprise to complete the feasibility studies that will then lead to the development of critical technology. The effort will heavily use the experience resident in the undersea weapons industrial base .

**E. Performance Metrics**

Successful launch of undersea weapons from an ORCA XLUUV.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | **Project (Number/Name)**<br>3395 / *Adv Undersea Prototyping-Explosive Payloads* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| XL Payload Interface Design & Fabrication | C/CPIF | TBD : TBD | 0.000 | 0.741 | Jun 2017 | 0.967 | Mar 2018 | 0.000 | | - | | 0.000 | 0.000 | 1.708 | - |
| COMMAND AND CONTROL | WR | TBD : TBD | 0.000 | 0.100 | Jul 2017 | 0.346 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.446 | - |
| Tech Support | C/CPFF | TBD : TBD | 0.000 | 0.189 | Jun 2017 | 0.234 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.423 | - |
| Management | WR | TBD : TBD | 0.000 | 0.190 | Jul 2017 | 0.137 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.327 | Continuing |
| Safety | WR | NSWC Indian Head : Indian Head, MD | 0.000 | 0.000 | | 0.330 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.330 | - |
| | | **Subtotal** | 0.000 | 1.220 | | 2.014 | | 0.000 | | - | | 0.000 | 0.000 | 3.234 | N/A |

**Remarks**

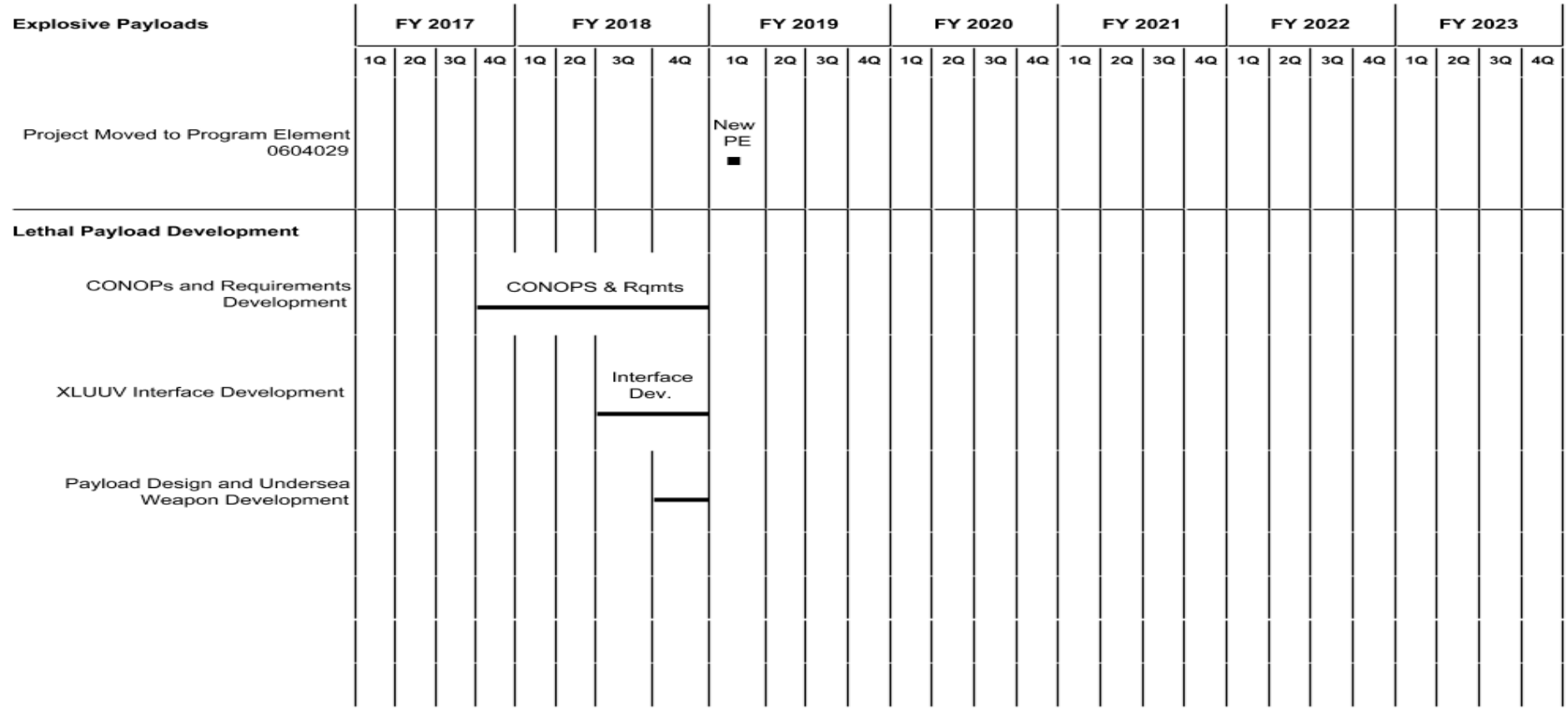
FY 2019 and future funding for project 3393 is in Program Element (PE) 0604029N

| | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 1.220 | | 2.014 | | 0.000 | | - | | 0.000 | 0.000 | 3.234 | N/A |

**Remarks**

FY 2019 and future funding for project 3393 is in Program Element (PE) 0604029N

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | **Project (Number/Name)**<br>3395 / *Adv Undersea Prototyping-Explosive Payloads* |




*2019PB - 0604536N - 3395*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | **Project (Number/Name)**<br>3395 / *Adv Undersea Prototyping-Explosive Payloads* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Explosive Payloads*** | | | | |
| Project Moved to Program Element 0604029: Schedule Detail | 1 | 2019 | 1 | 2019 |
| Lethal Payload Development: CONOPs and Requirements Development: CONOPs and Requirements | 4 | 2017 | 4 | 2018 |
| Lethal Payload Development: XLUUV Interface Development: Schedule Detail | 3 | 2018 | 4 | 2018 |
| Lethal Payload Development: Payload Design and Undersea Weapon Development: Phase A concept design- XL UUV Interface development | 4 | 2018 | 4 | 2018 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | Project (Number/Name)<br>3396 / *Adv Undersea Prototyping-Non-Lethal Payloads* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3396: *Adv Undersea Prototyping-Non-Lethal Payloads* | 0.000 | 0.500 | 1.017 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.517 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

FY 2019 and future funding for project 3393 is in Program Element (PE) 0604029N. Project moved from PE 0604536N starting in FY 2019.

**A. Mission Description and Budget Item Justification**

Advanced undersea prototyping will experiment and demonstrate non-lethal payloads on ORCA XLUUVs for use on ORCA XLUUV and other FoS UUVs. This effort will investigate the possibilities of employing non-lethal payloads from the XLUUV to support ISR and strike missions. Non-kinetic payloads provide the warfare commander an option to stop aggressive behavior without escalating the conflict. Non-lethal payloads that will be considered include jamming, EO/IR dazzling, microwave, aerial assets, and other methods.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Non Lethal Payloads | 0.500 | 1.017 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Continue the initial technology study and conduct market analysis. | | | | | |
| ***FY 2019 Base Plans:***<br>FY 2019 funding in Program Element (PE) 0604029N. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Project moved from PE 0604536N starting in FY 2019. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.500 | 1.017 | 0.000 | 0.000 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | **Project (Number/Name)**<br>3396 / *Adv Undersea Prototyping-Non-Lethal Payloads* |

**D. Acquisition Strategy**

A technology study and market research will be completed in the first 12 months to examine the options available and the impact to the warfighter the different technology options bring. This will use a group of experts throughout the advanced undersea industry. Initial design efforts of a prototype system for the development of a non-kinetic payload will start in late FY18 for preliminary efforts with main efforts occurring after the study is completed. The payload will be integrated and demonstrated on the ORCA XLUUV.

**E. Performance Metrics**

Non-kinetic payload integrated onto an XLUUV. Detailed metrics are classified.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | **Project (Number/Name)**<br>3396 / *Adv Undersea Prototyping-Non-Lethal Payloads* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Technology study | Various | TBD : TBD | 0.000 | 0.470 | Aug 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.470 | - |
| Design, Material, & Fabrication Efforts | WR | TBD : TBD | 0.000 | 0.000 | | 0.842 | Nov 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.842 | - |
| | | **Subtotal** | 0.000 | 0.470 | | 0.842 | | 0.000 | | - | | 0.000 | 0.000 | 1.312 | N/A |

**Remarks**

FY 2019 and future funding for project 3393 is in Program Element (PE) 0604029N

**Support ($ in Millions)**

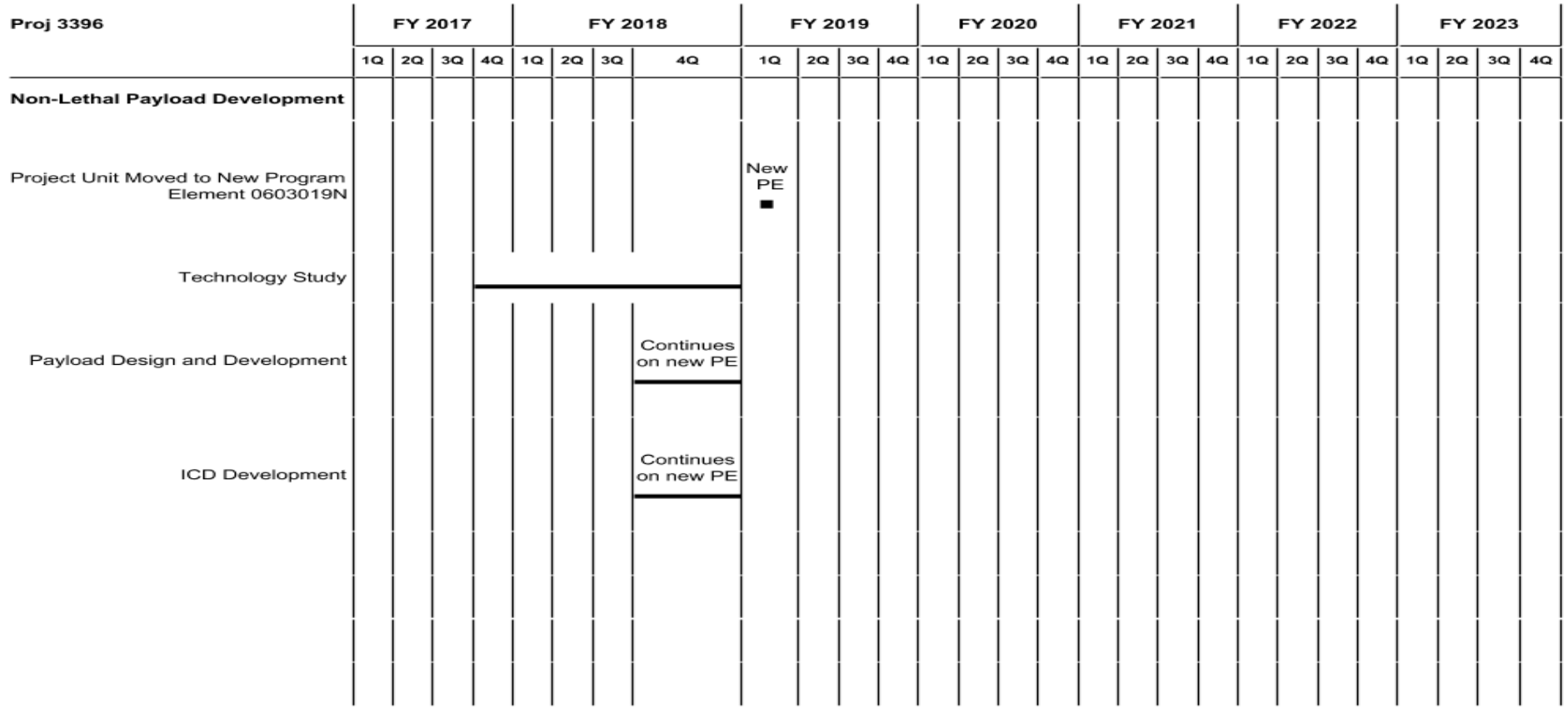
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DESIGN ANALYSIS | WR | NRL : WASHINGTON, D.C. | 0.000 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.000 | - |
| Program Support | C/FFP | various : Arlington, VA | 0.000 | 0.030 | Jul 2017 | 0.175 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 0.205 | - |
| | | **Subtotal** | 0.000 | 0.030 | | 0.175 | | 0.000 | | - | | 0.000 | 0.000 | 0.205 | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.500 | | 1.017 | | 0.000 | | - | | 0.000 | 0.000 | 1.517 | N/A |

**Remarks**

FY 2019 and future funding for project 3393 is in Program Element (PE) 0604029N

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | **Project (Number/Name)**<br>3396 / *Adv Undersea Prototyping-Non-Lethal Payloads* |




*2019PB - 0604536N - 3396*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | **Project (Number/Name)**<br>3396 / *Adv Undersea Prototyping-Non-Lethal Payloads* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3396*** | | | | |
| Non-Lethal Payload Development: Project Unit Moved to New Program Element 0603019N: | 1 | 2019 | 1 | 2019 |
| Non-Lethal Payload Development: Technology Study: | 4 | 2017 | 4 | 2018 |
| Non-Lethal Payload Development: Payload Design and Development: | 4 | 2018 | 4 | 2018 |
| Non-Lethal Payload Development: ICD Development: | 4 | 2018 | 4 | 2018 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | Project (Number/Name)<br>9999 / *Congressional Adds* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9999: *Congressional Adds* | 0.000 | 15.368 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 15.368 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Advanced Undersea Warfighting Prototypes (AUWP) will experiment and develop prototype technologies in support of Navy mining initiatives to augment/inform a future mining program of record. Efforts include a prototype system to advance the capability for a submarine launched autonomous undersea vehicle capable of delivering clandestine delivered mines
(CDM)and Smart Mining Initiative (SMI) efforts including a Sea Floor Sensing System, a UUV Launched Unmanned Aerial Vehicle (UAV) Electro-Optical (EO) Discriminator, Remote Control Safe and Arm, and EO Safe and Arm. AUWP brings together a number of rapid prototyping, experimentation, and demonstration projects advancing key elements of common undersea warfare kill chains. Range, endurance and capacity demonstrations will deliver warfighting effects at range and from the sea floor in the face of the most challenging anti-access and area denial environments. The concept experiments with two different advanced sensing technical approaches from undersea; one on the sea floor and one from a UUV launched Unmanned Aerial Vehicle (UAV). These advance the targeting, discrimination, and recognition capabilities. Finally, experiments with remote control (arm/de-arm) of fusing systems for maritime smart mines will be conducted.

Updated program and schedule plan agreed upon by all stakeholders to use funds sharing between AUP lines and AUWP line C305.

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2017 | FY 2018 |
|---|---|---|
| ***Congressional Add:*** Program Increase | 15.368 | 0.000 |
| ***FY 2017 Accomplishments:*** Detailed design contract for MEDUSA system awarded to Hydroid in Nov 2017. SMI efforts commenced. Funding for AUWP received in late July 2017.<br><br>MEDUSA Detailed design efforts run through 4QFY18 followed by system fabrication starting in 4QFY18. In FY 2019 complete MEDUSA fabrication, commence integration and test, and start TEMPALT development.<br><br>Smart Mining Initiative (SMI) efforts will complete in late FY18 with a final demo in early FY19. | | |
| ***FY 2018 Plans:*** N/A | | |
| **Congressional Adds Subtotals** | 15.368 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | **Project (Number/Name)**<br>9999 / *Congressional Adds* |

**C. Other Program Funding Summary ($ in Millions)**

**Remarks**

**D. Acquisition Strategy**

Naval research and development activities, in conjunction with Industry partners, will design, develop, build, and demonstrate prototype technologies. This proposed course of prototyping informs requirements, assesses operational utility and mitigates cost, schedule and technical risks of future program actions to develop and deliver game changing advancements in the undersea domain.

**E. Performance Metrics**

Metrics include mobility, system range, persistence and survivability for undersea warfare missions.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | **Project (Number/Name)**<br>9999 / *Congressional Adds* |

**Product Development ($ in Millions)**

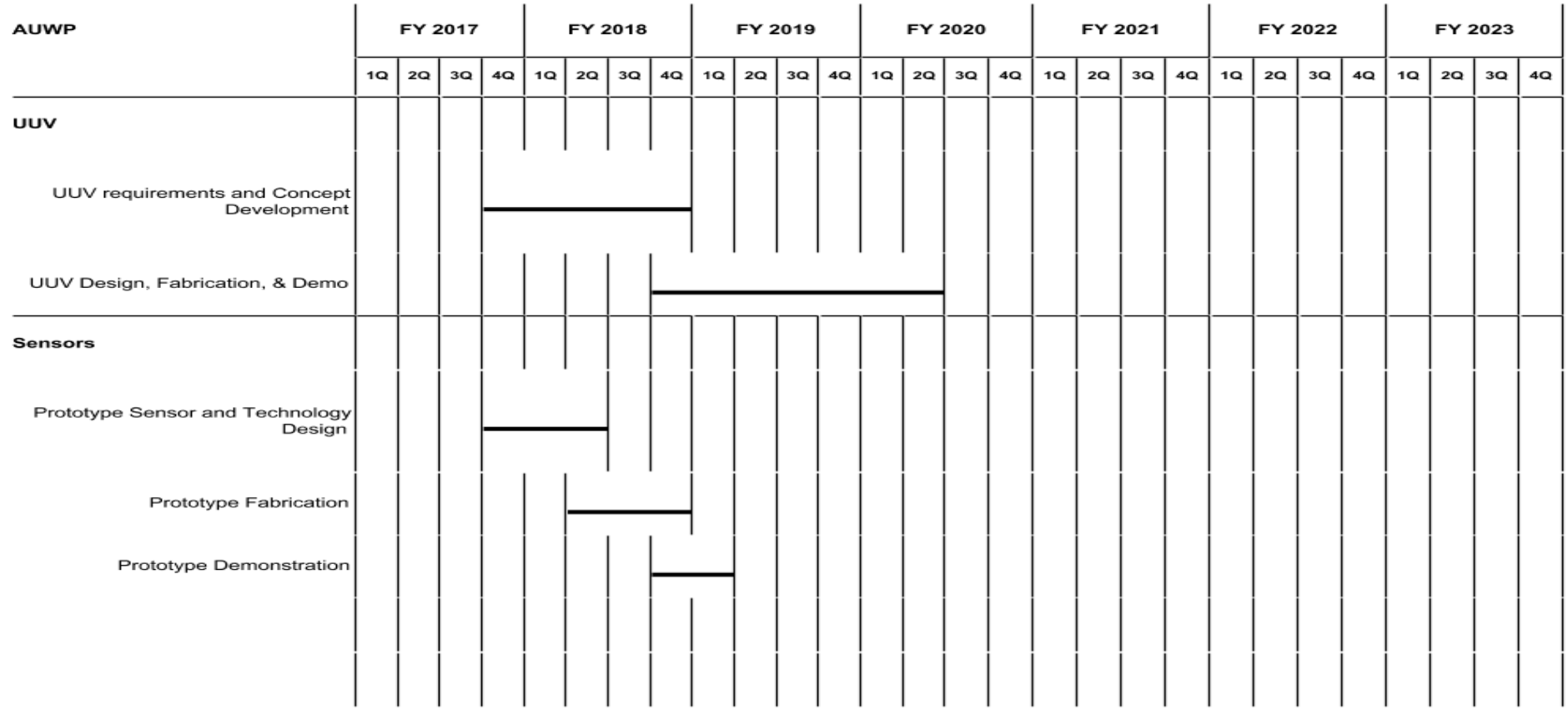
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AUWP Development | WR | NSWC PC : Panama City, FL | 0.000 | 4.800 | Aug 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 4.800 | - |
| AUWP Development | WR | SSC PAC : San Diego, CA | 0.000 | 2.300 | Aug 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.300 | - |
| AUWP Development | WR | NSWC IH : Indian Head, MD | 0.000 | 1.700 | Aug 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.700 | - |
| AUWP Development | WR | NUWC N : Newport, Rhode Island | 0.000 | 5.251 | Aug 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 5.251 | - |
| AUWP Development | WR | NSWC CD : Bethesda, MD | 0.000 | 0.325 | Aug 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.325 | - |
| AUWP Development | WR | NRL : Washington, DC | 0.000 | 0.500 | Aug 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.500 | - |
| AUWP Development | Various | Various : Various | 0.000 | 0.492 | Sep 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.492 | - |
| | | **Subtotal** | 0.000 | 15.368 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 15.368 | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 15.368 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 15.368 | N/A |

**Remarks**

Funds shown above do not reflect agreed to funds sharing plan. Schedule shown next reflects actual plan.

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | **Project (Number/Name)**<br>9999 / *Congressional Adds* |




*2019PB - 0604536N - 9999*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604536N / *(U)Advanced Undersea Prototyping* | **Project (Number/Name)**<br>9999 / *Congressional Adds* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***AUWP*** | | | | |
| UUV: UUV requirements and Concept Development: | 4 | 2017 | 4 | 2018 |
| UUV: UUV Design, Fabrication, & Demo: | 4 | 2018 | 2 | 2020 |
| Sensors: Prototype Sensor and Technology Design: | 4 | 2017 | 2 | 2018 |
| Sensors: Prototype Fabrication: | 2 | 2018 | 4 | 2018 |
| Sensors: Prototype Demonstration: | 4 | 2018 | 1 | 2019 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0604659N *I (U)Precision Strike Weapons Development Program* |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Program Element | 7.621 | 4.874 | 31.315 | 132.818 | - | 132.818 | 455.970 | 566.707 | 627.791 | 601.489 | Continuing | Continuing |
| 3334: *Conventional Prompt Strike (CPS)* | 0.000 | 0.000 | 0.000 | 15.000 | - | 15.000 | 290.373 | 374.579 | 478.377 | 482.745 | Continuing | Continuing |
| 3378: *Next Generation Land Attack Weapon (NGLAW)* | 7.621 | 4.874 | 9.994 | 16.866 | - | 16.866 | 49.288 | 91.658 | 109.844 | 112.035 | Continuing | Continuing |
| 3407: *Air Launched Decoy Development* | 0.000 | 0.000 | 21.321 | 100.952 | - | 100.952 | 116.309 | 100.470 | 39.570 | 6.709 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

Initial and continuing development of strike weapons consisting of armament, munitions, and weapon subsystems to allow for the horizontal integration among current and future weapon system capabilities to provide enhanced anti-surface and land strike capabilities in a demanding Anti-Access Area-Denial environment. This program provides for the development of weapon and weapon system technologies to address future requirements for enhanced and alternative weapon system capability requirements that include selectable output weapons, low collateral damage weapons, precision lethality weapons, area weapons, alternative warhead technology, Insenstive Munitions (IM), scaled munitions, Department of Defense (DoD) fuzing systems, sensors, extended range weapons and precision guided training round technology.

The Precision Strike Weapons Development Program Element supports the enhancement of Conventional Prompt Strike (CPS) war fighting capabilities. Program emphasis is on demonstrating component and subsystem technology maturity with risk reduction initiatives highlighted by flight tests. The program funds the design, development, and experimentation of boosters, payload delivery vehicles (PDVs), non-nuclear warheads, thermal protection systems, guidance systems, test range modernization, and mission planning and enabling capabilities. The development efforts could lead to a flight system that is non-ballistic over the majority of the flight path, controlled stage drop over Broad Ocean Area, positive control from launch to impact, adequate cross-range/maneuverability to avoid over flight issues, and effects on targets in a very short-period of time from execution order. To support these development activities, the program procures modeling and simulation capabilities, ground testing, command and control interfaces, test range support, and launch system infrastructure. Additionally, expert resources address strategic policy and treaty issues. Program timing will be driven by the outcome of flight and ground test events. Prior to FY 2019, Conventional Prompt Strike efforts were solely funded through Defense Wide Research and Development funding. In FY 2019, CPS efforts in this project are to support Navy integration efforts, conduct trade studies of system alternatives and risk reduction technology maturation efforts as the CPS program begins to transition to Navy in FY 2020.

The Precision Strike Weapons Development Program Element (PE) supports the Next Generation Strike Capability (NGSC) by funding Next Generation Land Attack Weapon (NGLAW); a surface/submarine fired survivable, long range, multi-mission, multi-platform conventional strike capability fielding in the FY 2028 - FY 2030 timeframe. The Next Generation Strike Capability (NGSC) strategy will address future threats in time to replace or update legacy weapons while bringing next generation technology to Department of the Navy (DON) standoff conventional strike (Land Attack & ASuW). Within NGSC, NGLAW will be capable of attacking land and maritime, stationary and mobile targets while supporting two of the Navy's primary mission areas: 'Power Projection' (land attack from the sea/undersea) and 'Sea

Control' against enemy surface action groups/combatants. To the maximum extent possible, NGSC will utilize common components and component technologies (e.g. navigation; communications; seeker; guidance and control) across the air-launched and sea-launched missile variants to reduce cost, shorten development timelines, and promote interoperability.

The Precision Strike Weapons Development Program Element (PE) supports the air-launched electronic warfare (EW) systems capability; through the integration of a Navy variant of the Miniature Air Launched Decoy (MALD). EW is an integral war-fighting effect supporting combatant commander integrated priorities, as well as Joint or Coalition operations. EW systems influence, deceive, disrupt, degrade, deny and destroy threats throughout the electromagnetic spectrum to airborne and air-launched systems and their operations. EW includes air-launched electronic attack (EA) as well as elements of electronic support (ES) and electronic protection (EP). EA provides self-protection capabilities to other weapon systems through active and passive measures that deceive threats to airborne and air-launched systems and their operations by using kinetic and non-kinetic means to defeat threats that rely on the electromagnetic spectrum (Radio Frequency (RF), Electro-Optical (EO), Infrared (IR). The ES capabilities support the collection, analysis, and dissemination of information related to the detection, geo-location, characterization, and identification of threats to airborne and air-launched systems and their operations. An air-launched EW system with stand-in capability increases the range and duration of EW systems while providing flexibility to commanders for employment.

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under ADVANCED COMPONENT DEVELOPMENT AND PROTOTYPES because it includes all efforts necessary to evaluate integrated technologies, representative models or prototype systems in a high fidelity and realistic operating environment.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 9.910 | 31.315 | 118.830 | - | 118.830 |
| Current President's Budget | 4.874 | 31.315 | 132.818 | - | 132.818 |
| Total Adjustments | -5.036 | 0.000 | 13.988 | - | 13.988 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -0.036 | 0.000 | | | |
| • Rate/Misc Adjustments | 0.000 | 0.000 | 13.988 | - | 13.988 |
| • Congressional Directed Reductions Adjustments | -5.000 | - | - | - | - |

**Change Summary Explanation**

Schedule: PU 3407

FY 2019 will continue the MALD technical maturation effort and begin the EMD effort.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0604659N *I (U)Precision Strike Weapons Development Program* |

Schedule: PU 3378

Analysis of alternatives (AoA) and Material Solution Analysis has been extended from 1Q FY 2017-2Q FY 2018 to 1Q FY 2017-4Q FY 2018 due to the physical and informational technology security processes needed to be executed for a study of this scope.

The Technology Maturation and Risk Reduction (TMRR) phase moved from 2Q FY 2018 to 1Q FY 2019 due to extended AoA completion.

Schedule: PU 3334

The Convention Prompt Strike schedule has been added reflecting TMRR and Engineering Manufacturing and Development (EMD) associated with the design, development, and experimentation of boosters, payload delivery vehicles (PDVs), non-nuclear warheads, thermal protection systems, guidance systems, test range modernization, and mission planning and enabling capabilities.

FY 2019 program increase of $15.0M supports the Convention Prompt Strike program integration efforts.

FY 2019 program decrease of $1.0M due to inflation rate changes.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604659N / *(U)Precision Strike Weapons Development Program* | Project (Number/Name)<br>3334 / *Conventional Prompt Strike (CPS)* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3334: *Conventional Prompt Strike (CPS)* | 0.000 | 0.000 | 0.000 | 15.000 | - | 15.000 | 290.373 | 374.579 | 478.377 | 482.745 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The Precision Strike Weapons Development Program Element supports the enhancement of Conventional Prompt Strike (CPS) warfighting capabilities. Program emphasis is on demonstrating component and subsystem technology maturity with risk reduction initiatives highlighted by flight tests. The program funds the design, development, and experimentation of boosters, payload delivery vehicles (PDVs), non-nuclear warheads, thermal protection systems, guidance systems, test range modernization, and mission planning and enabling capabilities. The development efforts could lead to a flight system that is non-ballistic over the majority of the flight path, controlled stage drop over Broad Ocean Area, positive control from launch to impact, adequate cross-range/maneuverability to avoid overflight issues, and effects on targets in a very short-period of time from execution order. To support these development activities, the program procures modeling and simulation capabilities, ground testing, command and control interfaces, test range support, and launch system infrastructure. Additionally, expert resources address strategic policy and treaty issues. Program timing will be driven by the outcome of flight and ground test events. Prior to FY 2019, Conventional Prompt Strike efforts were solely funded through Defense Wide Research and Development funding. In FY 2019, CPS efforts in this project are to support Navy integration efforts, conduct trade studies of system alternatives and risk reduction technology maturation efforts as the CPS program begins to transition to Navy in FY 2020.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Conventional Prompt Strike (CPS) | 0.000 | 0.000 | 15.000 | 0.000 | 15.000 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** The Precision Strike Weapons Development Program Element supports the enhancement of Conventional Prompt Strike (CPS) warfighting capabilities. Program emphasis is on demonstrating component and subsystem technology maturity with risk reduction initiatives highlighted by flight tests. The program funds the design, development, and experimentation of boosters, payload delivery vehicles (PDVs), non-nuclear warheads, thermal protection systems, guidance systems, test range modernization, and mission planning and enabling capabilities. The development efforts could lead to a flight system that is non-ballistic over the majority of the flight path, controlled stage drop over Broad Ocean Area, positive control from launch to impact, adequate cross-range/maneuverability to avoid overflight issues, and effects on targets in a very short-period of time from execution order. To support these development activities, the program procures modeling and simulation capabilities, ground testing, command and control interfaces, test range support, and launch system infrastructure. Additionally, expert resources address strategic policy and treaty issues. Program timing will be driven by the outcome of flight and ground test events. Prior to FY 2019, Conventional Prompt Strike efforts | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604659N / *(U)Precision Strike Weapons Development Program* | **Project (Number/Name)**<br>3334 / *Conventional Prompt Strike (CPS)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| were solely funded through Defense Wide Research and Development funding. In FY 2019, CPS efforts in this project are to support Navy integration efforts, conduct trade studies of system alternatives and risk reduction technology maturation efforts as the CPS program begins to transition to Navy in FY 2020.<br><br>***FY 2018 Plans:***<br>N/A<br>***FY 2019 Base Plans:***<br>(U) FY 2019 PLAN<br>(U) ($15.000M)<br><br>FY 2019 efforts include:<br><br>(U) Conduct trade studies of system alternatives. Evaluations to include: Architecture, Lethality, Survivability, Affordability, Maintainability, Facilitation needs, and others<br>(U) Conduct risk reduction technology maturation efforts including: Common weapons launcher integration activity, shipboard/flight systems trade space evaluation and sensitivity analyses, communications analysis, CONOPs evaluations & recommendations, warhead advancements and dual/use capability, and a range of survivability technology advancements.<br>(U) Support other integration activities as needed potentially for subsurface and/or surface ships (SSN, Virginia Payload Module, DDG) and other leading architectures<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Funding increased in FY 2019 for Conventional Prompt Strike program integration efforts ($15M). | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 0.000 | 15.000 | 0.000 | 15.000 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604659N / *(U)Precision Strike Weapons Development Program* | **Project (Number/Name)**<br>3334 / *Conventional Prompt Strike (CPS)* |

**D. Acquisition Strategy**

The acquisition strategy will be influenced through the completion of trade studies of system alternatives and risk reduction technology maturation efforts through various contracts and warfare centers.

**E. Performance Metrics**

Program reviews and assessments of R&D testing results.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604659N / *(U)Precision Strike Weapons Development Program* | **Project (Number/Name)**<br>3334 / *Conventional Prompt Strike (CPS)* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conventional Prompt Strike | C/BA | Not Specified : Not Specified | 0.000 | 0.000 | | 0.000 | | 14.500 | Nov 2018 | - | | 14.500 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 14.500 | | - | | 14.500 | Continuing | Continuing | N/A |

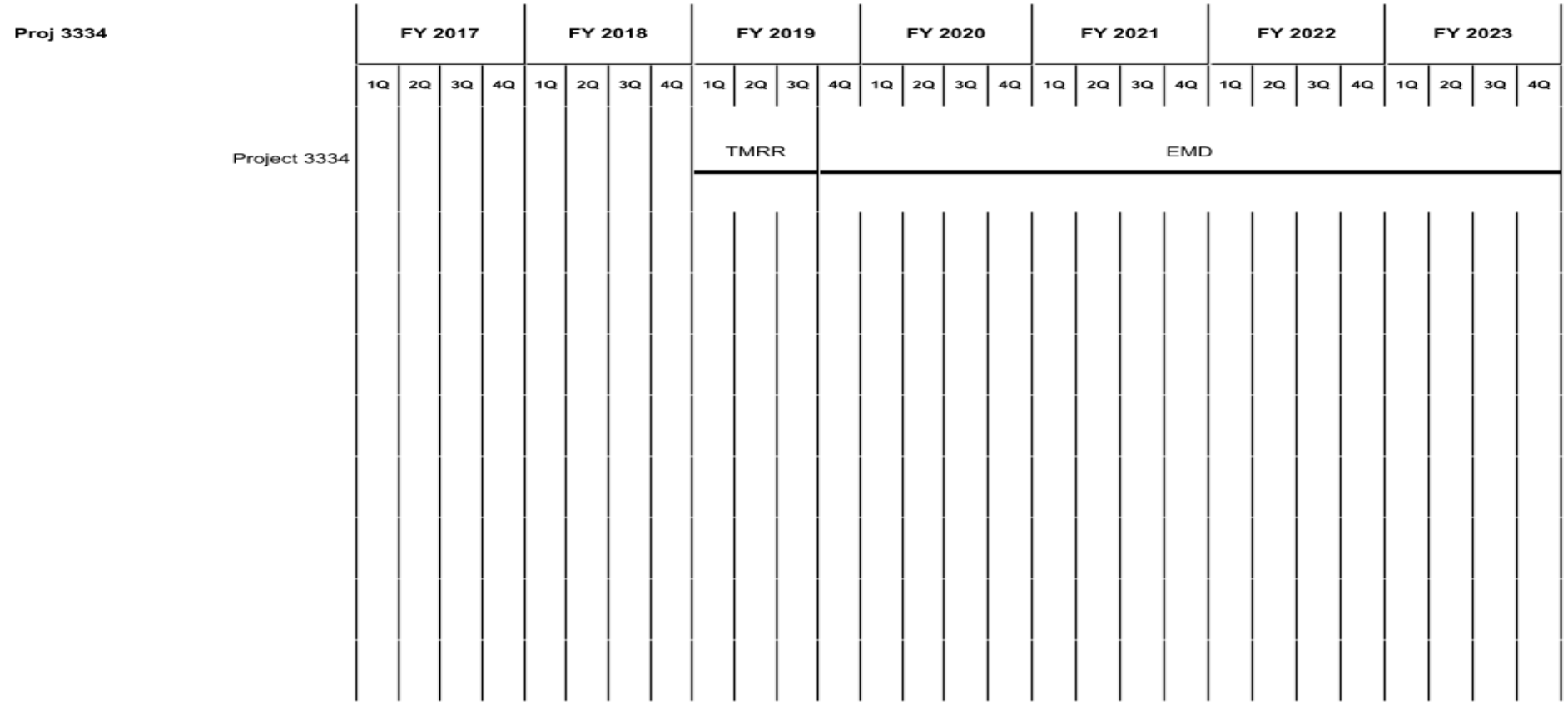
**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conventional Prompt Strike | TBD | TBD : TBD | 0.000 | 0.000 | | 0.000 | | 0.500 | Oct 2018 | - | | 0.500 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 0.500 | | - | | 0.500 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 0.000 | | 15.000 | | - | | 15.000 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604659N / *(U)Precision Strike Weapons Development Program* | **Project (Number/Name)**<br>3334 / *Conventional Prompt Strike (CPS)* |




*2019PB - 0604659N - 3334*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604659N / *(U)Precision Strike Weapons Development Program* | **Project (Number/Name)**<br>3334 / *Conventional Prompt Strike (CPS)* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3334*** | | | | |
| Project 3334: Technology Maturation and Risk Reduction | 1 | 2019 | 3 | 2019 |
| Project 3334: Engineering and Manufacturing Development | 4 | 2019 | 4 | 2023 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604659N / *(U)Precision Strike Weapons Development Program* | Project (Number/Name)<br>3378 / *Next Generation Land Attack Weapon (NGLAW)* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3378: *Next Generation Land Attack Weapon (NGLAW)* | 7.621 | 4.874 | 9.994 | 16.866 | - | 16.866 | 49.288 | 91.658 | 109.844 | 112.035 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Funding is provided for the Next Generation Land Attack Weapon (NGLAW) that includes a survivable, long range, multi-mission, multi-platform (surface and subsurface) conventional strike capability in the FY 2028 - FY 2030 timeframe. NGLAW will address future threats while bringing ship/submarine Next Generation Strike Capability (NGSC) to Department of the Navy (DON) standoff conventional strike (land and maritime attack). NGLAW will be capable of attacking land and maritime, stationary and mobile targets while supporting two of the Navy's primary mission areas: 'Power Projection' (land attack from the sea/undersea) and 'Sea Control' against enemy surface action groups/combatants. To the maximum extent possible, the Navy will utilize common components and component technologies (e.g. navigation; communications; seeker; guidance and control) to reduce cost, shorten development timelines, and promote interoperability.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Next Generation Land Attack Weapon (NGLAW) | 4.874 | 9.994 | 16.866 | 0.000 | 16.866 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Continue NGLAW AoA assessing weapons systems, emergent technologies, and industry Internal Research and Development (IRAD) activities/proposals that can be used across multiple mission areas to reduce risk, development time,<br>and cost. Complete threat assessments based on current and future scenarios and environments to inform performance<br>requirements and relevant technology. | | | | | |
| ***FY 2019 Base Plans:***<br>Commence the Technology Maturation and Risk Reduction (TMRR) Phase of the NGLAW program. Efforts include competitive prototyping of system elements, the refinement of requirements, and the development of functional and allocated baselines of the end-item system configuration for the follow-on long range cruise missile strike mission.<br><br>FY 2019 efforts specifically include multiple contract awards associated with the prototyping of critical technologies identified during the Analysis of Alternatives to include engines, warhead, electronic warfare, | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604659N / *(U)Precision Strike Weapons Development Program* | **Project (Number/Name)**<br>3378 / *Next Generation Land Attack Weapon (NGLAW)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| seekers/sensors, and airframe prototype designs to reduce technical risk, validate designs, validate cost estimates, evaluate manufacturing processes, and refine requirements.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>The increase in FY 2019 required to transition the NGLAW program from the Analysis of Alternatives (AoA) to the Technology Maturation and Risk Reduction (TMRR) phase. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 4.874 | 9.994 | 16.866 | 0.000 | 16.866 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Acquisition strategy will be influenced by the output of the Analysis of Alternatives (AoA) and the Material Development Decision (MDD). Commencing in FY 2019, the NGLAW program will enter the Technology Maturation and Risk Reduction (TMRR) phase which will conduct competitive prototyping of system elements and refine requirements of the future long range cruise missile. The TMRR phase will decrease technical risk and develop a sufficient understanding of a solution in order to make sound business decisions on initiating a formal acquisition program in the Engineering, Manufacturing and Development (EMD) Phase.

**E. Performance Metrics**

Performance Metrics will be influenced by the output of the AoA.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604659N / *(U)Precision Strike Weapons Development Program* | **Project (Number/Name)**<br>3378 / *Next Generation Land Attack Weapon (NGLAW)* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TMRR - Airframe | C/CPFF | TBD : TBD | 0.000 | 0.000 | | 0.000 | | 2.573 | Nov 2018 | - | | 2.573 | 0.000 | 2.573 | - |
| TMRR - Engines | C/CPFF | TBD : TBD | 0.000 | 0.000 | | 0.000 | | 4.289 | Nov 2018 | - | | 4.289 | 0.000 | 4.289 | - |
| TMRR - Seeker/Sensor | C/CPFF | TBD : TBD | 0.000 | 0.000 | | 0.000 | | 3.431 | Dec 2018 | - | | 3.431 | 0.000 | 3.431 | - |
| TMRR - Electronic Warfare | C/CPFF | TBD : TBD | 0.000 | 0.000 | | 0.000 | | 1.715 | Jan 2019 | - | | 1.715 | 0.000 | 1.715 | - |
| TMRR- Warhead | C/CPFF | TBD : TBD | 0.000 | 0.000 | | 0.000 | | 0.860 | Nov 2018 | - | | 0.860 | 0.000 | 0.860 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 12.868 | | - | | 12.868 | 0.000 | 12.868 | N/A |

**Remarks**

The FY 2019 airframe, engines seeker/sensor and electronic warfare contracts will be multiple competitive awards.
FY 2019 funding increases due to program transition from AoA phase to Technical Maturation Risk Reduction (TMRR) baseline assesment phase. TMRR will involve multiple contracts for subcomponent prototyping by industry vendors and multiple Statement's of Work (SOWs) for subcomponent prototyping by Government Field Activities, as determined by the AoA requirements.

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Development Support | WR | NAWC-WD : China Lake, CA | 0.150 | 2.300 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Development Support- AIR 4.0M | WR | NAWC-AD : Patuxent River, MD | 1.314 | 1.800 | Dec 2016 | 2.470 | Nov 2017 | 0.988 | Oct 2018 | - | | 0.988 | Continuing | Continuing | Continuing |
| Development Support | SS/CPFF | JHU/APL : Patuxent River, MD | 2.050 | 0.774 | Dec 2016 | 1.114 | Nov 2017 | 0.445 | Dec 2018 | - | | 0.445 | Continuing | Continuing | Continuing |
| Weapons Control System | WR | NSWC-DD : Dahlgren, VA | 0.025 | 0.000 | | 3.360 | Nov 2017 | 1.344 | Nov 2018 | - | | 1.344 | 0.000 | 4.729 | Continuing |
| Mission Planning System | WR | NAVAIR : Patuxent River, MD | 0.000 | 0.000 | | 3.050 | Nov 2017 | 1.221 | Nov 2018 | - | | 1.221 | 0.000 | 4.271 | Continuing |
| Development Support | WR | NSMA : JBAB, DC | 3.488 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.488 | Continuing |
| Development Support | MIPR | NRO : Chantilly, VA | 0.569 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.569 | Continuing |
| Development Support | WR | NSWC-NPT : Newport, RI | 0.025 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.025 | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604659N / *(U)Precision Strike Weapons Development Program* | Project (Number/Name)<br>3378 / *Next Generation Land Attack Weapon (NGLAW)* | |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Subtotal** | 7.621 | 4.874 | | 9.994 | | 3.998 | | - | | 3.998 | Continuing | Continuing | N/A |

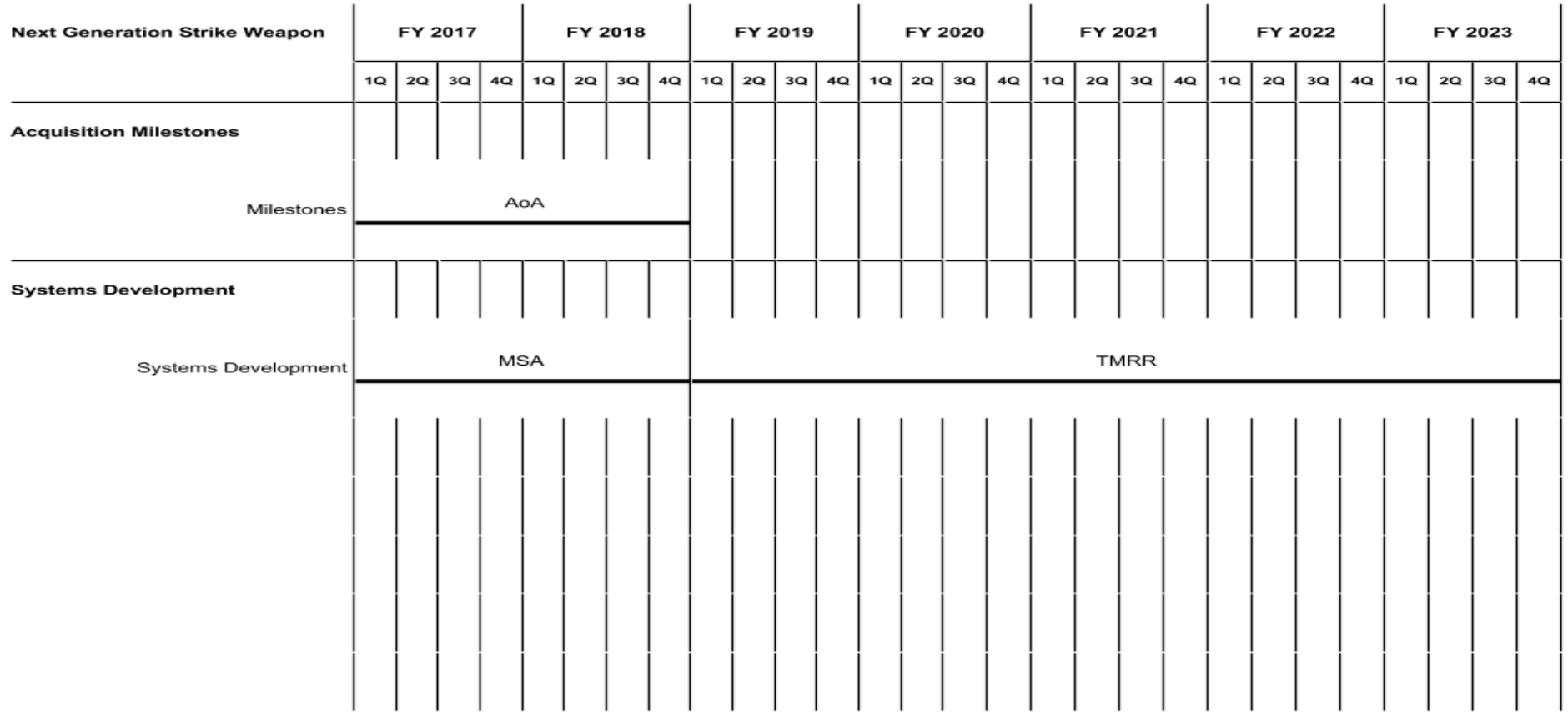
**Remarks**

Development Support - funding in FY 2019 required to support the commencement of the Technology Maturation and Risk Reduction Phase of the NGLAW program.

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 7.621 | 4.874 | | 9.994 | | 16.866 | | - | | 16.866 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604659N / *(U)Precision Strike Weapons Development Program* | **Project (Number/Name)**<br>3378 / *Next Generation Land Attack Weapon (NGLAW)* |




*2019PB - 0604659N - 3378*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604659N / *(U)Precision Strike Weapons Development Program* | **Project (Number/Name)**<br>3378 / *Next Generation Land Attack Weapon (NGLAW)* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Next Generation Strike Weapon*** | | | | |
| Acquisition Milestones: Milestones: Analysis of Alternatives | 1 | 2017 | 4 | 2018 |
| Systems Development: Systems Development: Technology Maturation and Risk Reduction | 1 | 2019 | 4 | 2023 |
| Systems Development: Systems Development: Material Solution Analysis | 1 | 2017 | 4 | 2018 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604659N / *(U)Precision Strike Weapons Development Program* | Project (Number/Name)<br>3407 / *Air Launched Decoy Development* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3407: *Air Launched Decoy Development* | 0.000 | 0.000 | 21.321 | 100.952 | - | 100.952 | 116.309 | 100.470 | 39.570 | 6.709 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

This project develops a Navy variant of the Miniature Air Launched Decoy (MALD). The variant will address current and future advanced Integrated Air Defense System (IADS) threats by bringing an air-launched, stand-in EW capability to Department of the Navy (DON) suppression of enemy air defenses/destruction of enemy air defenses (SEAD/DEAD) and standoff conventional land strike. A Navy variant of MALD with stand-in capability increases the range and duration of EW systems while providing flexibility to commanders for employment. To the maximum extent possible, the Navy will utilize existing technology from the current MALD-J production line and other common components (e.g. navigation, communication, guidance and control, payload) to reduce cost, shorten development timelines and promote interoperability. OPNAV has written a draft CDD in preparation for entry into formal staffing in 4Q2017.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Miniature Air Launched Decoy (MALD) | 0.000 | 21.321 | 100.952 | 0.000 | 100.952 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Begin technical maturation efforts. FY 2018 will transition MALD from a Strategic Capabilities Office (SCO) Demonstration to a Navy program of record. The Navy program builds upon the SCO demonstration, which allows the Navy to begin integration, development and mission planning activities in FY 2018. Tasks scheduled to begin in FY 2018 include but are not limited to: Aircraft Integration/Air Worthiness to include wind tunnel testing and fit checks specific to F/A-18 E/F; software development of a MALD mission planning module hosted into Joint Mission Planning System (JMPS) and a Navy MALD unique "Airborne Electronic Attack" planning module and material purchases to support developmental activities. Material purchases in FY 2018 support base plan activities. Long lead material procurements in FY 2018 support continued development and aircraft integration work and have an 18 month lead time for some AUR components and up to a 24 month lead time for Range Safety/Flight Termination Systems. Funding also provides for Engineering, Logistics and Program Management support. This is not a new start. | | | | | |
| ***FY 2019 Base Plans:***<br>Continue and complete technical maturation efforts. Begin Engineering, Manufacturing, and Development phase activities. FY 2019 builds upon the FY18 technical maturation effort, to take the program through SETR 2.0 and SETR 3.0, and begin planning for SETR 4.0. Component level development will continue into FY 2019, with | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604659N / *(U)Precision Strike Weapons Development Program* | **Project (Number/Name)**<br>3407 / *Air Launched Decoy Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| power and distribution, airframe and container completing by the end of the FY. Tasks scheduled to continue in FY 2019 include but are not limited to: Aircraft Integration/ Air Worthiness to include wind tunnel testing and fit checks specific to F/A-18 E/F; software development of a MALD mission planning module hosted into Joint Mission Planning System (JMPS) and a Navy MALD unique "Airborne Electronic Attack" planning module and material purchases to support development activities. Material purchases in FY 2019 support development of test assets. Long Lead material procurements in FY 2019 support continued development and aircraft integration work and have an 18 month lead time for some AUR components and up to a 24 month lead time for Range Safety/Flight Termination Systems. Funding also provides for Engineering, Logistics and Program Management support.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2018 provided funding to begin tasks related to aircraft integration and air worthiness that includes wind tunnel testing specific to F/A-18 E/F. FY 2019 provides funding to begin design and development of the MALD-N, container re-design and procure long lead items required to build test assets. FY 2019 increase supports the commencement of engineering, manufacturing and development phase and award. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 21.321 | 100.952 | 0.000 | 100.952 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • 0204162N/2285: *Drones and Decoys* | 0.000 | 0.000 | 0.000 | - | 0.000 | 0.000 | 61.291 | 84.166 | 133.728 | 0.000 | 279.185 |

**Remarks**

**D. Acquisition Strategy**

Research and development performed by contractor and government staff.

**E. Performance Metrics**

Acquisition Strategy, Class Justification and Approval, Acquisition Plan.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604659N / *(U)Precision Strike Weapons Development Program* | Project (Number/Name)<br>3407 / *Air Launched Decoy Development* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Product Development | C/CPFF | TBD : TBD | 0.000 | 0.000 | | 14.315 | Mar 2018 | 73.005 | Jan 2019 | - | | 73.005 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 14.315 | | 73.005 | | - | | 73.005 | Continuing | Continuing | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Government Support | WR | NAWC AD : Patuxent River, MD | 0.000 | 0.000 | | 2.000 | Oct 2017 | 10.204 | Nov 2018 | - | | 10.204 | Continuing | Continuing | Continuing |
| Government Support | WR | NAWC WD : China Lake, CA | 0.000 | 0.000 | | 4.000 | Oct 2017 | 16.947 | Nov 2018 | - | | 16.947 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 6.000 | | 27.151 | | - | | 27.151 | Continuing | Continuing | N/A |

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Government Support | WR | NAWC AD : Patuxent River, MD | 0.000 | 0.000 | | 0.500 | Oct 2017 | 0.333 | Nov 2018 | - | | 0.333 | Continuing | Continuing | Continuing |
| Government Support | WR | NAWC WD : China Lake, CA | 0.000 | 0.000 | | 0.256 | Oct 2017 | 0.171 | Nov 2018 | - | | 0.171 | Continuing | Continuing | Continuing |
| Project Management Support | C/CPFF | NAWC AD : Patuxent River, MD | 0.000 | 0.000 | | 0.200 | Mar 2018 | 0.212 | Nov 2018 | - | | 0.212 | Continuing | Continuing | Continuing |
| Travel | Various | NAVAIR : Patuxent River, MD | 0.000 | 0.000 | | 0.050 | Oct 2017 | 0.080 | Nov 2018 | - | | 0.080 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 1.006 | | 0.796 | | - | | 0.796 | Continuing | Continuing | N/A |

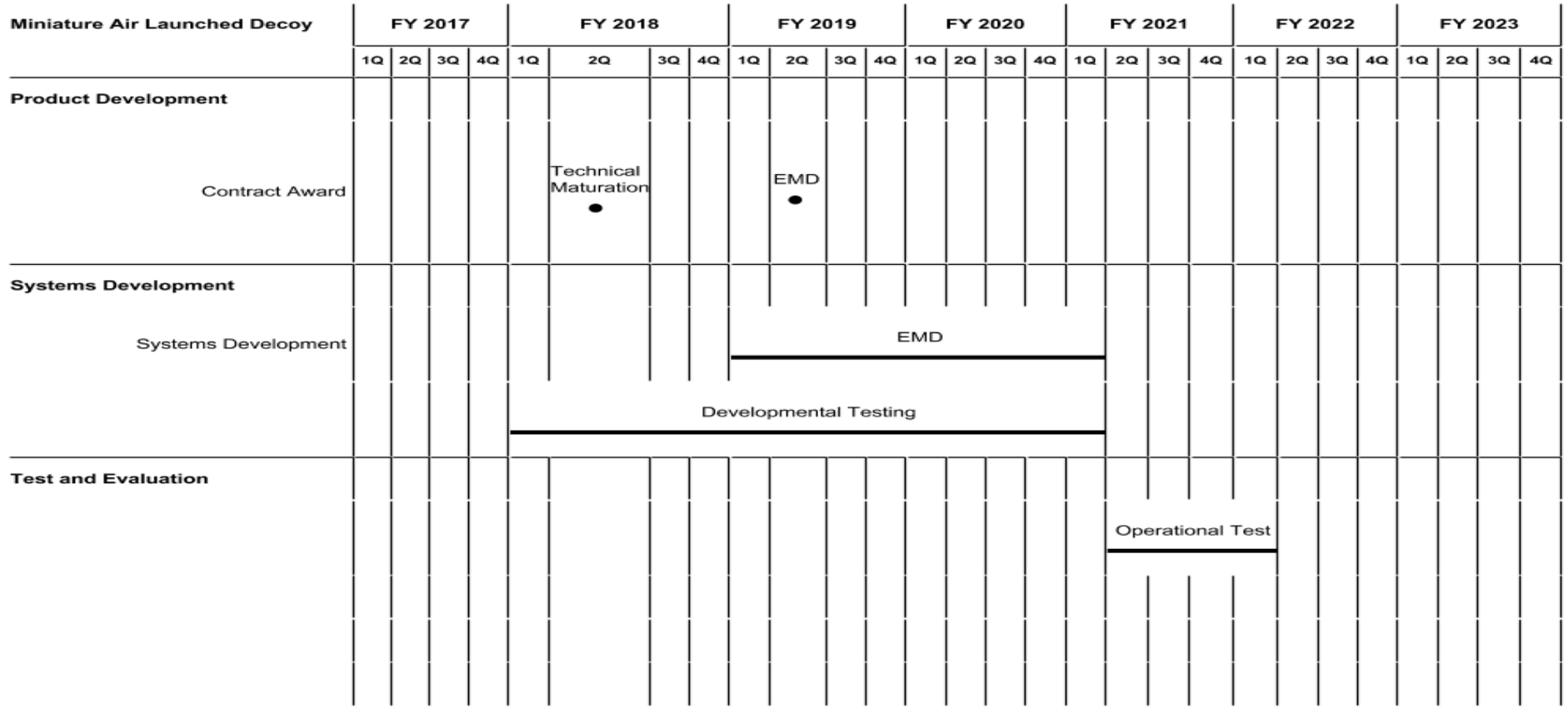
| | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 21.321 | | 100.952 | | - | | 100.952 | Continuing | Continuing | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604659N / *(U)Precision Strike Weapons Development Program* | Project (Number/Name)<br>3407 / *Air Launched Decoy Development* | |

| | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604659N / *(U)Precision Strike Weapons Development Program* | **Project (Number/Name)**<br>3407 / *Air Launched Decoy Development* |




*2019PB - 0604659N - 3407*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604659N / *(U)Precision Strike Weapons Development Program* | **Project (Number/Name)**<br>3407 / *Air Launched Decoy Development* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Miniature Air Launched Decoy*** | | | | |
| Product Development: Contract Award: Technical Maturation Contract Award | 2 | 2018 | 2 | 2018 |
| Product Development: Contract Award: EMD Contract Award | 2 | 2019 | 2 | 2019 |
| Systems Development: Systems Development: Engineering and Manufacturing Development | 1 | 2019 | 1 | 2021 |
| Systems Development: Systems Development: Developmental Testing | 1 | 2018 | 1 | 2021 |
| Test and Evaluation: Operational Test | 2 | 2021 | 1 | 2022 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | | Date: February 2018 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0604707N *I SEW Architecture/Eng Support* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 264.184 | 20.104 | 42.851 | 7.230 | - | 7.230 | 8.160 | 9.024 | 9.220 | 9.407 | Continuing | Continuing |
| 0798: *Allied/Coalition Interoperability and Information Dominance (ACIID)* | 32.608 | 0.943 | 1.096 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 34.647 |
| 2144: *Space & Elec Warfare Engineering* | 209.167 | 12.879 | 33.716 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 255.762 |
| 2147: *ISR Architecture* | 0.000 | 1.482 | 1.587 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 3.069 |
| 2356: *Maritime Concept Generation & Development* | 22.409 | 4.800 | 6.452 | 7.230 | - | 7.230 | 8.160 | 9.024 | 9.220 | 9.407 | Continuing | Continuing |

**Note**

Beginning in FY19, Allied/Coalition Interoperability and Information Dominance (ACIID) (now called Allied/Coalition Maritime Environment (ACME)) Project 0798, Space & Electronic Warfare (SEW) Engineering Project 2144, and Intelligence, Surveillance, and Reconnaissance (ISR) Architecture Project 2147 were realigned from PE 0604707N SEW Architecture/ENG Support to PE 0606355N Warfare Innovation Management.

**A. Mission Description and Budget Item Justification**

The CGCD project (2356) focuses on the generation, development and validation of warfighting concepts, Concept of Operations (CONOPS) and doctrine in order to eliminate war fighting gaps. Naval Warfare Development Command (NWDC) also manages the Fleet Experimentation program (formerly Sea Trial). In FY2019 the project will execute a number of new experimentations in the areas of Electromagnetic Maneuver Warfare (EMW), Mine Warfare, Naval Integrated Fires, and Unmanned systems and conduct experiments (war simulations, Modeling & Simulation (M&S), at-sea events) to develop emerging Naval concepts.

The ACIID project (0798), now called ACME, promotes interoperability with allied and coalition forces by facilitating maritime interoperability in both processes and communication systems, including emerging capabilities, to counter growing high-end asymmetric threats.

The SEW Engineering project (2144) is a systems engineering non-acquisition program to develop, test, implement Technical Authority (TA) products, and validate Naval Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR), Business Information Technology (IT), and Space System architectures to support naval, Joint and Coalition missions across normal, contested, and degraded cyber/operational environments. The objective of this project is carried out by multiple tasks that ensure development and delivery of naval Information Warfare (IW) capabilities that are well-integrated, interoperable, secure, and resilient to meet validated warfighting requirements.

The Intelligence, Surveillance, and Reconnaissance (ISR) Architecture project (2147) is intended to guide system of systems capability development and promote interoperability across Navy ISR programs, as well as interoperability and alignment with Department of Defense (DoD)-wide enterprise initiatives including Joint

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* |

Information Environment (JIE) and Intelligence Community (IC) Information Technology Environment (ITE). This effort to develop integrated ISR architectures will also help instill systems engineering discipline and standardization across the Navy ISR Enterprise and provide a means by which to assess ISR Program of Record (PoR) progress in conforming to a single Navy architecture.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 23.971 | 42.851 | 32.518 | - | 32.518 |
| Current President's Budget | 20.104 | 42.851 | 7.230 | - | 7.230 |
| Total Adjustments | -3.867 | 0.000 | -25.288 | - | -25.288 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -0.504 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | -25.189 | - | -25.189 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -0.099 | - | -0.099 |
| • Congressional General Reductions Adjustments | -0.043 | - | - | - | - |
| • Congressional Directed Reductions Adjustments | -3.320 | - | - | - | - |

**Change Summary Explanation**

The FY 2019 funding request for project 2144 Space and Elec Warfare Engineering was reduced by $2.222 million to account for the availability of prior year execution balances. This updated control is now reflected in under Program Element 0606355N WARFARE INNOVATION MANAGEMENT.
$4.165 millions of FY19 funding was transferred from project 2144 Space and Elec Warfare Engineering for Risk management Framework.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604707N / *SEW Architecture/Eng Support* | Project (Number/Name)<br>0798 / *Allied/Coalition Interoperability and Information Dominance (ACIID)* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0798: *Allied/Coalition Interoperability and Information Dominance (ACIID)* | 32.608 | 0.943 | 1.096 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 34.647 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Note**

Project title changed as follows: Allied/Coalition Maritime Environment (ACME) (Previously called Allied/Coalition Interoperability and Information Dominance (ACIID) in FY17 and prior.)

**A. Mission Description and Budget Item Justification**

The ACME program advances Information Warfare (IW) (to include Command, Control, Communications, Computers; Intelligence, Surveillance and Reconnaissance (C4ISR); Electronic Warfare (EW); and Cyber Warfare), interoperability with Australia, Canada, New Zealand, United Kingdom, United States (AUSCANNZUKUS), North Atlantic Treaty Organization (NATO), and other Allied and Coalition partners. The program determines maritime operational gaps with our allies, identifies Doctrine, Organization, Training, Material, Leadership, Personnel, and Facilities (DOTMLPF) solutions with the potential to fill those gaps, and assesses these solutions and associated concepts of operation in laboratory and at-sea environments. The ACME program includes integration and testing in support of joint and Allied war fighting capabilities, including interoperability testing of IW equipment. Allied and joint interoperability is critical for future maritime operations, especially as the United States Navy (USN) expands Internet Protocol (IP) networking throughout the fleet via Consolidated Afloat Networks and Enterprise Services (CANES), Next Generation Networks (NGEN), Mission Partner Environment/ Future Mission Networking (MPE/FMN), the U.S. Battlefield Information Collection and Exploitation System - eXtended (BICES-X), and with the Joint Information Environment (JIE).

Currently, IP connectivity with AUSCANNZUKUS and other Allied/Coalition forces is limited, requiring extensive backhaul through ashore infrastructure. Higher bandwidth solutions suitable for use over tactical networks require development and assessment for emerging coalition and joint interoperability requirements, such as Maritime Domain Awareness (MDA), Network Operations Without Shore (NOWS), Satellite Communications (SATCOM) Denied, Degraded, Intermittent and Low-bandwidth (DDIL) operations, and to counter Anti-Access Area Denial (A2/AD) threats. Increases in data throughput are required for the effective exchange of rich IW data sets and services via Service Oriented Architectures (SOA) within the limitations of High Frequency (HF), Ultra-High Frequency (UHF), and other portions of the radio frequency spectrum, coupled with appropriate Information Assurance and Computer Network Defense (IA/CND) mechanisms. Development and assessment of potential solutions will integrate improved IP capabilities with the Advanced Digital Network Systems (ADNS) and existing international standards (e.g. Allied Communications Publication 200, NATO Standardization Agreements 5066 and 4691). The continued development and refinement of advanced tactical networking technologies and protocols, to include Low Probability of Intercept (LPI), Low Probability of Detection (LPD), and Anti-Jam (AJ) capabilities as well as Automatic Link Establishment (ALE) standards, will provide for a significant improvement in secure data sharing within, and between, coalition maritime elements.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Advanced Relay Capabilities | 0.943 | 1.096 | 0.000 | 0.000 | 0.000 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>0798 / *Allied/Coalition Interoperability and Information Dominance (ACIID)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>- Develop and refine advanced tactical networking and communication capabilities that facilitate Denied, Degraded, Intermittent and Low-bandwidth (DDIL) operations, including polar environments, which counter Anti-Access Area Denial (A2/AD) threats and promote Allied interoperability and task group-centric operations. Solutions will address higher bandwidth, Low Probability of Intercept (LPI)/Low Probability of Detection (LPD)/ Anti-Jam (AJ) technologies across the Radio Frequency (RF) and Optical spectrum and include airborne capabilities.<br>- Continue to develop and assess secure and interoperable technologies and capabilities supporting DDIL operations, to include multibearer routing, distributed applications and services for Mission Partner Environment/ Future Mission Networking (MPE/FMN), the use of cross-domain and data labeling solutions in maritime tactical networking environments and advanced Information Assurance and Computer Network Defense (IA/CND) solutions. The overarching goal is to maximize interoperability and network and application efficiency using multiple, dissimilar bearers and integrate these advanced solutions into an Allied/Coalition networking capability capable of DDIL operations, countering A2/AD threats and integrating with MPE/FMN architectures.<br>- Continue to assess the U.S. Battlefield Information Collection and Exploitation System - extended (BICES-X) technologies and associated interoperability issues in DDIL environments.<br>- Continue to increase Allied Information Warfare (IW) interoperability with other joint and maritime multi-national forums, such as the Combined Communications Electronic Board (CCEB), Multinational Maritime Information-system Interoperability Steering Group (M2I2), MPE/FMN and Joint Information Environment (JIE) forums.<br>- Continue to assess and validate individual technologies, integrated solutions, and associated Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel and Facilities (DOTMLPF) through experimentation, trials and demonstrations with Australia, Canada, New Zealand, United Kingdom, United States (AUSCANNZUKUS) and other Allied/Coalition partners during operational venues such as Rim of the Pacific (RIMPAC) or Joint Warrior. | | | | | |
| ***FY 2019 Base Plans:***<br>FY19 Allied/Coalition Maritime Environment (ACME) funding resides under PE 0606355N Warfare Innovation Management. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>0798 / *Allied/Coalition Interoperability and Information Dominance (ACIID)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Beginning in FY19, the ACME funding profile transferred from PE 0604707N SEW ARCHITECTURE/ENG SUPPORT to PE 0606355N Warfare Innovation Management. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.943 | 1.096 | 0.000 | 0.000 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Allied/Coalition Maritime Environment (ACME) is a non-acquisition program that promotes United States Navy interoperability with allied and coalition forces to achieve the Chief of Naval Operations (CNO) vision by facilitating maritime interoperability in both processes and communications systems, including emerging capabilities, to counter growing high-end asymmetric threats, and is a key enabler of the force multiplying benefits achieved through cooperation among the Australia, Canada, New Zealand, United Kingdom, United States (AUSCANNZUKUS), North Atlantic Treaty Organization (NATO), and other partner nations. Activities include acquiring intellectual capital in emerging technical areas through contracts providing technical engineering expertise and surge capacity for emerging tasks.

**E. Performance Metrics**

Advanced Relay Capabilities: The ACME program will employ laboratory testing and at-sea demonstrations to assess specific technologies, operational concepts, and integrated Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel and Facilities (DOTMLPF) solutions pertaining to Denied, Degraded, Intermittent and Low-bandwidth (DDIL) operational environments, Network Operations Without Shore (NOWS), Maritime Domain Awareness (MDA), Mission Partner Environment/ Future Mission Networking (MPE/FMN), Joint Information Environment (JIE), and other aspects of Information Warfare (IW). These assessments will report on identified capability gaps, link capability gaps to technology/DOTMLPF gaps, identify technologies and DOTMLPF solutions considered ready for deployment, transition to a program of record to enhance Fleet war fighting capability, and enhance Allied interoperability.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>0798 / *Allied/Coalition Interoperability and Information Dominance (ACIID)* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Advanced Relay Capabilities | C/CPFF | SAIC : McLean, VA | 0.000 | 0.110 | Jan 2017 | 0.126 | Jan 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.110 | | 0.126 | | 0.000 | | - | | 0.000 | Continuing | Continuing | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Advanced Relay Capabilities | Various | Various : Various | 31.131 | 0.117 | Jan 2017 | 0.135 | Jan 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Advanced Relay Capabilities | WR | SSC PAC : San Diego | 0.000 | 0.716 | Jan 2017 | 0.835 | Jan 2018 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 31.131 | 0.833 | | 0.970 | | 0.000 | | - | | 0.000 | Continuing | Continuing | N/A |

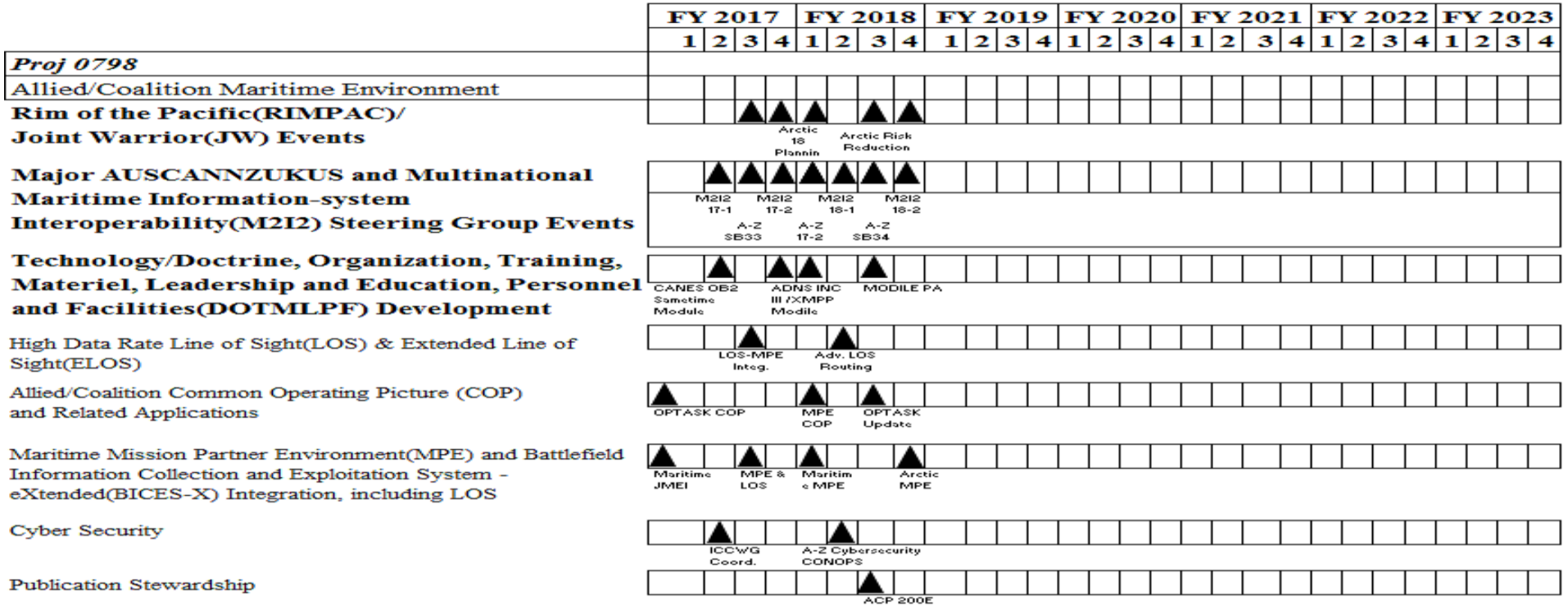
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Management Services | Various | Various : Various | 1.477 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.477 | - |
| | | **Subtotal** | 1.477 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.477 | N/A |

| | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 32.608 | 0.943 | | 1.096 | | 0.000 | | - | | 0.000 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>0798 / *Allied/Coalition Interoperability and Information Dominance (ACIID)* |




**NOTE: Beginning in FY19, the ACME funding profile transferred from PE 0604707N to PE 0606355N.**

Legend

| | |
|---|---|
| HF: High Frequency | OPTASK: Operational Tasking |
| RF: Radio Frequency | JMEI: Joining, Membership and Exiting Instructions |
| ADNS: Automated Digital Network System | CSfC: Commercial Solutions for Classified |
| WBHF: Wide Band High Frequency | ICCWG: International Computer Network Defense Coordination Working Group |
| NVIS: Near Vertical Inidence Skywave | ACP: Allied Communications Publication |
| FSO: Free Space Optics | CONOPS: Concept of Operations |
| IdAM: Identity and Access Management | CANES: Consolidated Afloat Networks and Enterprise Services |
| FMV: Full Motion View | LPI/LPD: Low Probability of Intercept/Low Probability of Detection |
| SOPs: Standard Operating Procedures | |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>0798 / *Allied/Coalition Interoperability and Information Dominance (ACIID)* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 0798*** | | | | |
| Allied/Coalition Maritime Environment (ACME): RIMPAC/Joint Warrior Event Quarterly FY17-FY18 | 3 | 2017 | 1 | 2018 |
| Allied/Coalition Maritime Environment (ACME): RIMPAC/Joint Warrior Event Quarterly FY18-FY19 | 3 | 2018 | 4 | 2018 |
| Allied/Coalition Maritime Environment (ACME): AUSCANNZUKUS M212 Quarterly Events | 2 | 2017 | 4 | 2018 |
| Allied/Coalition Maritime Environment (ACME): MODILE Events | 1 | 2017 | 4 | 2018 |
| Allied/Coalition Maritime Environment (ACME): High Data Rate LOS & ELOS | 1 | 2017 | 4 | 2018 |
| Allied/Coalition Maritime Environment (ACME): Allied/Coalition COP and Related Applications | 1 | 2017 | 4 | 2018 |
| Allied/Coalition Maritime Environment (ACME): Maritime MPE and BICES-X Events | 1 | 2017 | 4 | 2018 |
| Allied/Coalition Maritime Environment (ACME): Cyber Security Events | 1 | 2017 | 4 | 2018 |
| Allied/Coalition Maritime Environment (ACME): Publication Stewardship Bi-Annual Events | 1 | 2017 | 4 | 2018 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604707N / *SEW Architecture/Eng Support* | Project (Number/Name)<br>2144 / *Space & Elec Warfare Engineering* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2144: *Space & Elec Warfare Engineering* | 209.167 | 12.879 | 33.716 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 255.762 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

To support Navy objectives in advancing Information Warfare (IW) capabilities, the Space and Electronic Warfare (SEW) Engineering project provides five main functions:

(1) Develop the architectures, specifications and standards, tools, and processes to support a single integrated Navy plan for cybersecurity. These engineering artifacts provide Navy specific guidance to drive common and consistent implementation of security controls across current and future Navy Programs of Record/projects. This eliminates redundancies and inefficiencies characteristic of previous stove-pipe development efforts in which each system addressed security individually. These efforts enable a standardized approach to move out faster to improve the Navy's cyber resiliency.

(2) Provide the cybersecurity vulnerability and functional test capability which supports cybersecurity test requirements and the Command, Control, Communications, Computers, Intelligence (C4I) components of USS Secure. USS Secure is a cyber assessment program within the Navy. This System of Systems (SoS) (Afloat, Aloft, C4I & Shore) capability in a test laboratory environment provides a rapidly re-configurable capability that integrates maritime hardware systems into a virtual platform. This platform level SoS provides cybersecurity research, development, test and evaluation, and training, not otherwise possible. This combination of Systems Commands (SYSCOM) laboratories, cyber ranges, and Red Teams simulating Navy platforms in operational maritime environments is critical for effectively evaluating cyber threats against specified mission threads.

(3) Define an integrated Enterprise Architecture to support design, development and delivery of integrated Navy Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR), Business Information Technology (IT), and Space System capabilities. This architecture reflects current (as-is) and future (target) end states to support technical analyses, program planning, and enterprise-level investment decisions across IW capabilities. Perform mission based system of systems analysis to ensure integration and interoperability, and validate end-to-end warfighting capabilities to quickly address emerging threats.

(4) Provides engineering tools and processes to drive rigorous Systems Engineering discipline across the acquisition lifecycle to support rapid development and delivery of secure and interoperable C4ISR, Business IT, and Space Systems capabilities that meet Fleet requirements. Conduct Systems Engineering Technical Reviews (SETRs) to provide independent, objective assessments of technical maturity and compliance with applicable architectures, specifications and standards across IW capabilities.

(5) The Coalition Warrior Interoperability eXploration, eXperimentation, eXamination, eXercise (CWIX) provides a means to demonstrate and evaluate the interoperability of United States (US), North Atlantic Treaty Organization (NATO), and coalition information sharing systems.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>2144 / *Space & Elec Warfare Engineering* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Cybersecurity Architecture, Specifications and Standards | 8.459 | 8.460 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |

***FY 2018 Plans:***

- Continue to develop the architectures, specifications, and standards that provide the technical foundation of a single, integrated Navy plan for cybersecurity in accordance with changes in the threat environment, advances in technology, and evolving Department of Defense (DoD) guidance.
- Enforce implementation guidance for Navy Information Assurance (IA) (cybersecurity) standards to ensure inclusion in design requirements and development and production contracts that touch or influence cybersecurity designs for Navy networks.
- Assess Navy Programs of Record (PoR) plans for implementation of cybersecurity controls, assess compliance to determine cyber risk with IA Technical Authority (TA) cybersecurity architectures and standards, and perform risk assessments that articulate systems' ability to effectively support operational missions in various cyber conditions.
- Continue DFIANT work across Naval Systems Commands (SYSCOMs) to develop domain-specific implementations of the Defense-in-Depth Functional Implementation Architecture (DFIA) by defining control points, IA and logical attributes, controlling parameters, and inheritable security controls to establish a layered approach to cybersecurity.
- Define enterprise-level engineering requirements to support effective implementation and integration of Navy Cybersecurity Situational Awareness (NCSA) tools to enable command and control of Navy networks under all cyber conditions.
- Continue to assess Acquisition Category (ACAT) programs compliance with Information Technology (IT),IA, and TA architectures, specifications and standards.

***FY 2019 Base Plans:***

FY19 Cybersecurity Architecture, Specifications and Standards funding resides under PE 0606355N WARFARE INNOVATION MANAGEMENT.

***FY 2019 OCO Plans:***

N/A

***FY 2018 to FY 2019 Increase/Decrease Statement:***

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>2144 / *Space & Elec Warfare Engineering* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Beginning in FY19, the Cybersecurity Architecture, Specifications and Standards funding profile transferred from PE 0604707N SEW ARCHITECTURE/ENG SUPPORT to PE 0606355N WARFARE INNOVATION MANAGEMENT. | | | | | |
| ***Title:*** Cybersecurity Vulnerability & Functional Test Capability | 0.000 | 21.311 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | 2 | - | - | - |
| ***FY 2018 Plans:***<br>- Initial planning and procurement to establish cybersecurity test capabilities and the Command, Control, Communications, Computers, Intelligence (C4I) components of the USS Secure, a cross-SYSCOM distributed Cyber test capability in support of cybersecurity testing. Procure two (2) laboratory assets, one (1) force-level and one (1) unit-level, to establish Command, Control, Communications, Computers, Intelligence (C4I) suites for testing the System of Systems (SoS) cyber capabilities in an end-to-end environment.<br>- Perform Non-Recurring Engineering (NRE) and testing to evaluate the compliance efforts of Programs of Record (PoRs) with the Department of Defense (DoD) and the Department of Navy (DoN) cybersecurity Test and Evaluation (T&E) policies, directives and requirements.<br>- Design the capability to test operationally representative C4I baselines including force level platforms, unit level platforms, and associated shore services and transport capabilities.<br>- Develop and mature connectivity (including assessment and authorization) strategies to combine Systems Command (SYSCOM) laboratories, cyber ranges, and Red Teams to develop more accurate simulations of Navy platforms in operational maritime environments allowing for critical, effective, and expeditious evaluation of cyber threats against specified mission threads. | | | | | |
| ***FY 2019 Base Plans:***<br>FY19 Cybersecurity Vulnerability & Functional Test Capability funding resides under PE 0606355N WARAFE INNOVATION MANAGEMENT. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Beginning in FY19, the Cybersecurity Vulnerability & Functional Test Capability funding profile transferred from PE 0604707N SEW ARCHITECTURE/ENG SUPPORT to PE 0606355N WARAFE INNOVATION MANAGEMENT. | | | | | |
| ***Title:*** Enterprise Architecture | 0.845 | 0.716 | 0.000 | 0.000 | 0.000 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>2144 / *Space & Elec Warfare Engineering* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>- Continue development of an overarching Space and Naval Warfare Systems Command (SPAWAR) Enterprise Architecture with associated specifications, standards and profiles to support effective engineering, design, development, acquisition, and delivery of Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR), Business Information Technology (IT), and Space System capabilities.<br>- Continue to develop the Architecture Data Repository as the single, authoritative source of validated engineering artifacts with associated technical performance attributes.<br>- Continue development of Model Based System Engineering (MBSE) capabilities, processes and tools to support complex SoS technical performance gap analysis and trade recommendations by identifying capability gaps and overlaps, interoperability issues, and cybersecurity risks between Navy SoS capabilities.<br>- Continue to refine the Integration and Interoperability (I&I) Capability framework to support development of mission threads in order to perform System of Systems (SoS) analyses of how well systems operate together across the Naval enterprise to deliver validated warfighting capabilities.<br>- Continue to evolve Assured Command and Control (C2), Battlespace Awareness, and Integrated Fires (IF) Integrated Capabilities Technical Baselines (ICTBs) to ensure Information Warfare (IW) capabilities align to mission-specific kill chains to reduce interoperability seams across the supporting SoS.<br>- Ensure alignment of ICTBs development to emerging Digital Warfare Office (DWO) objectives for increased interoperability and information sharing across weapons, sensors, and shooters. | | | | | |
| ***FY 2019 Base Plans:***<br>FY19 Enterprise Architecture funding resides under PE 0606355N WARFARE INNOVATION MANAGEMENT. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Beginning in FY19, the Enterprise Architecture funding profile transferred from PE 0604707N SEW ARCHITECTURE/ENG SUPPORT to PE 0606355N WARFARE INNOVATION MANAGEMENT. | | | | | |
| ***Title:*** SYSCOM Systems Engineering | 2.592 | 2.197 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>2144 / *Space & Elec Warfare Engineering* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| - Perform Systems Engineering Technical Reviews (SETRs) of acquisition programs ensuring compliance with statutory and regulatory directives, as well as applicable Information Technology (IT) and Information Assurance (IA) Technical Authority (TA) architectures, specifications, standards and profiles.<br>- Develop inputs and perform technical reviews of formal acquisition and engineering documentation to ensure the application of sound systems engineering analysis and design principles to system planning requirements, design, testing, and supportability. Provide independent technical analyses to support Milestone Decisions.<br>- Continue to conduct Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) certifications through design and testing analysis, ensuring C4ISR delivery to the platform (shore, surface ship, submarine) is validated to meet the operational need and is interoperable with platform, force level, and joint/allied/coalition forces.<br>- Assess opportunities to leverage existing processes to define a more holistic cyber certification that moves toward assessments of groups of platforms (i.e., Carrier Strike Groups) and the overall cyber risk to performing operational missions.<br>- Continue to perform engineering evaluations, assessments of compliance with authoritative architectures and technical standards, and provide expertise to address technical issues in the following domains: C2; Intelligence, Surveillance, & Reconnaissance/Information Operations (ISR/IO); Space Systems, Business Information Technology (IT); and Communications & Networks.<br>- Continue maturation of the Space and Naval Warfare Systems Command (SPAWAR) Engineering Competency Development Model (CDM) framework by defining CDM roles for IT Engineers, Cybersecurity Engineers and Software Systems Engineers.<br>- Develop and pilot a Competency Assessment Process and establish IT requirements for an integrated talent management dashboard.<br>***FY 2019 Base Plans:***<br>FY19 SYSCOM Systems Engineering funding resides under PE 0606355N WARFARE INNOVATION MANAGEMENT.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Beginning in FY19, the SYSCOM Systems Engineering funding profile transferred from PE 0604707N SEW ARCHITECTURE/ENG SUPPORT to PE 0606355N WARFARE INNOVATION MANAGEMENT. | | | | | |
| ***Title:*** Coalition Warrior Interoperability eXploration, eXperimentation, eXamination, eXercise (CWIX) | 0.983 | 1.032 | 0.000 | 0.000 | 0.000 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>2144 / *Space & Elec Warfare Engineering* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>-Continue to develop interoperability and information sharing through coalition engagement, technology, demonstrations, and assessments leading to improvements of Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) systems within the Navy and in conjunction with Joint Services and Coalition efforts.<br>-Continue to pursue and utilize greater Pacific Command (PACOM) and Southern Command (SOUTHCOM) Partner Nation engagement by fostering a connected, distributed experimentation environment suitable for expanded experimentation in those areas to include innovative enhancements such as Commercial Solutions for Classified (CSFC).<br>-Continue to enhance interoperability across North Atlantic Treaty Organization (NATO) and affiliated Coalition Partners by participating in the planning and execution of CWIX.<br>-Continue to assess Coalition Interoperability assurance, validation, and verification as related to the engineering and execution of the Mission Partner Environment (MPE) via the Coalition Interoperability Assurance Validation (CIAV) infrastructure. | | | | | |
| ***FY 2019 Base Plans:***<br>FY19 CWIX funding resides under PE 0606355N WARFARE INNOVATION MANAGEMENT. | | | | | |
| ***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Beginning in FY19, the CWIX funding profile transferred from PE 0604707N SEW ARCHITECTURE/ENG SUPPORT to PE 0606355N WARFARE INNOVATION MANAGEMENT. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 12.879 | 33.716 | 0.000 | 0.000 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Space and Electronic Warfare (SEW) Engineering is a non-acquisition program that develops, tests, implements technical authority, and validates naval Navy Command, Control, Communications, Computers, Intelligence,

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>2144 / *Space & Elec Warfare Engineering* |

Surveillance, and Reconnaissance (C4ISR); provides integrated Architecture products and supports C4ISR systems engineering processes and standards. Activities include acquiring intellectual capital in emerging technical areas through contracts providing technical engineering expertise and surge capacity for emerging tasks.

**E. Performance Metrics**

The SEW engineering program will employ rigorous and consistent system engineering practices in an evolving value model to support development and deployment of shipboard, undersea, and land based capabilities based on mission and performance requirements, integrated enterprise architectures, model-validated solutions, and sustainment and supportability needs for the Command and Control (C2), Intelligence, Networks, Communications, Space, and Business Information Technology (IT) domains.

Coalition Warrior Interoperability eXploration, eXperimentation, eXamination, eXercise (CWIX) Performance Metrics: Three key metrics: (1) Interoperability and compliance with Naval (Navy and Marine Corps), joint, coalition and other non-governmental organization architectures, systems and equipment; (2) Compliance with Defense Information Services Agency (DISA), National Security Agency (NSA), and other joint and coalition information assurance and security standards; and (3) warfighter utility assessment across the joint and coalition spectrum. Specific metrics validate performance of individual technologies participating in CWIX as well as in other venues as appropriate.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>2144 / *Space & Elec Warfare Engineering* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cybersecurity Architecture, Specifications and Standards | Various | Various : Various | 8.667 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 8.667 | - |
| Cybersecurity Architecture, Specifications and Standards | C/CPFF | AUSGAR : San Diego, CA | 4.503 | 1.164 | Mar 2017 | 1.164 | Mar 2018 | 0.000 | | - | | 0.000 | 0.000 | 6.831 | - |
| Cybersecurity Architecture, Specifications and Standards | WR | SSC LANT : Charleston, SC | 2.876 | 1.269 | Feb 2017 | 1.270 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 5.415 | - |
| Cybersecurity Architecture, Specifications and Standards | WR | SSC PAC : San Diego, CA | 7.413 | 3.089 | Feb 2017 | 3.090 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 13.592 | - |
| Cybersecurity Architecture, Specifications and Standards | C/CPFF | BAH : McLean, VA | 4.694 | 2.937 | Jul 2017 | 2.936 | Jul 2018 | 0.000 | | - | | 0.000 | 0.000 | 10.567 | - |
| Cybersecurity Vulnerability & Functional Test Capability. | C/CPFF | SSC PAC : San Diego, CA | 0.000 | 0.000 | | 2.880 | Jun 2018 | 0.000 | | - | | 0.000 | 0.000 | 2.880 | - |
| Cybersecurity Vulnerability & Functional Test Capability | WR | SSC PAC : San Diego, CA | 0.000 | 0.000 | | 7.110 | Mar 2018 | 0.000 | | - | | 0.000 | 0.000 | 7.110 | - |
| Cybersecurity Vulnerability & Functional Test Capability | WR | SSC LANT : Charleston, SC | 0.000 | 0.000 | | 4.421 | Mar 2018 | 0.000 | | - | | 0.000 | 0.000 | 4.421 | - |
| Cybersecurity Vulnerability & Functional Test Capability | C/CPFF | Various : Various | 0.000 | 0.000 | | 6.900 | Mar 2018 | 0.000 | | - | | 0.000 | 0.000 | 6.900 | - |
| | | **Subtotal** | 28.153 | 8.459 | | 29.771 | | 0.000 | | - | | 0.000 | 0.000 | 66.383 | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604707N / *SEW Architecture/Eng Support* | Project (Number/Name)<br>2144 / *Space & Elec Warfare Engineering* | |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SEW Development Support/Systems Engineering | Various | Various : Various | 78.537 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 78.537 | - |
| SEW/C4I Technology Integration | Various | Various : Various | 12.985 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 12.985 | - |
| MDA Prototype SE Support | Various | Various : Various | 17.376 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 17.376 | - |
| Enterprise Architecture | Various | Various : Various | 3.630 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 3.630 | - |
| Enterprise Architecture | C/CPFF | AUSGAR : San Diego, CA | 1.740 | 0.380 | Mar 2017 | 0.322 | Mar 2018 | 0.000 | | - | | 0.000 | 0.000 | 2.442 | - |
| Enterprise Architecture | WR | SSC LANT : Charleston, SC | 0.994 | 0.127 | Feb 2017 | 0.107 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 1.228 | - |
| Enterprise Architecture | WR | SSC PAC : San Diego, CA | 2.427 | 0.338 | Feb 2017 | 0.287 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 3.052 | - |
| SYSCOM Systems Engineering | C/CPFF | AUSGAR : San Diego, CA | 3.115 | 1.530 | Mar 2017 | 1.297 | Mar 2018 | 0.000 | | - | | 0.000 | 0.000 | 5.942 | - |
| SYSCOM Systems Engineering | WR | SSC PAC : San Diego, CA | 5.487 | 0.752 | Feb 2017 | 0.638 | Feb 2018 | 0.000 | | - | | 0.000 | 0.000 | 6.877 | - |
| SYSCOM Systems Engineering | C/CPFF | SAIC : McLean, VA | 0.630 | 0.310 | Aug 2017 | 0.262 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 1.202 | - |
| | | **Subtotal** | 126.921 | 3.437 | | 2.913 | | 0.000 | | - | | 0.000 | 0.000 | 133.271 | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SEW Eng/CWIX/JRAE | Various | Various : Various | 48.685 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 48.685 | - |
| SEW Eng/CWIX | MIPR | Defense Information Systems Agency : Arlington, VA | 0.599 | 0.110 | Apr 2017 | 0.115 | Apr 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.824 | - |
| SEW Eng/CWIX | WR | SSC PAC : San Diego, CA | 3.977 | 0.549 | Dec 2016 | 0.576 | Dec 2017 | 0.000 | | - | | 0.000 | 0.000 | 5.102 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>2144 / *Space & Elec Warfare Engineering* |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SEW Eng/CWIX | C/CPFF | SAIC : McLean, VA | 0.498 | 0.213 | Aug 2017 | 0.223 | Jan 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.934 | - |
| SEW Eng/CWIX | C/CPFF | AUSGAR : San Diego, CA | 0.263 | 0.111 | Mar 2017 | 0.118 | Mar 2018 | 0.000 | | - | | 0.000 | 0.000 | 0.492 | - |
| | | **Subtotal** | 54.022 | 0.983 | | 1.032 | | 0.000 | | - | | 0.000 | 0.000 | 56.037 | N/A |

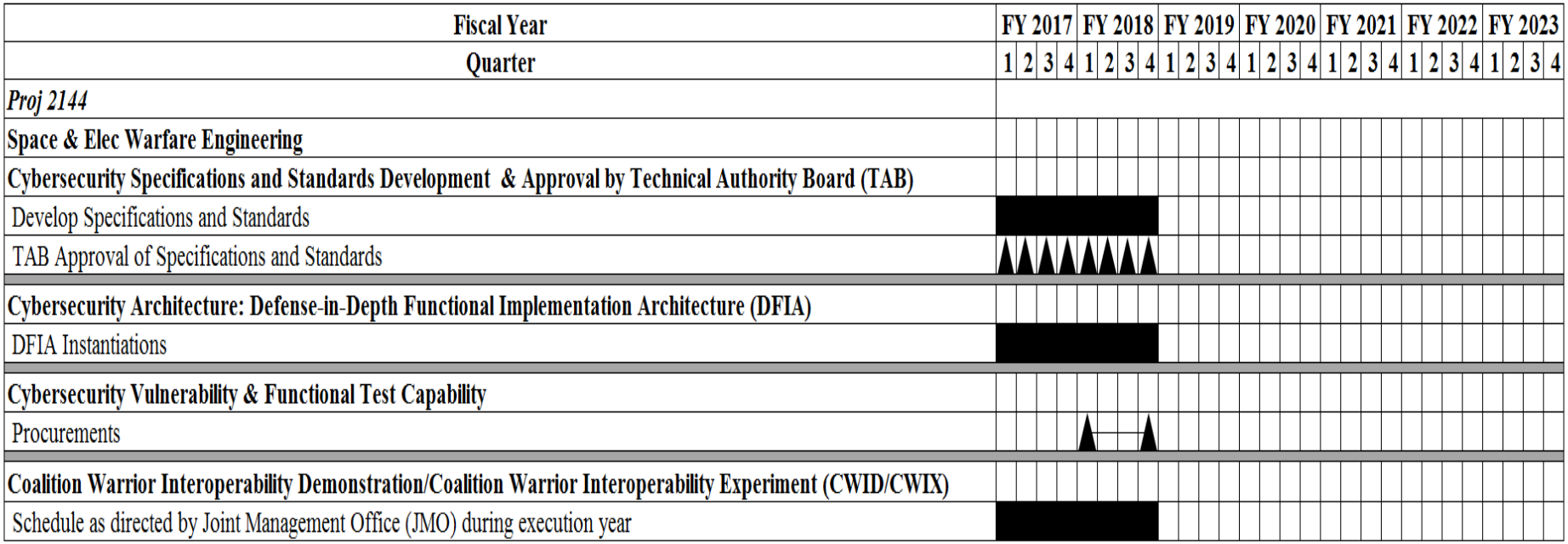
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ACQ Workforce Fund | Various | Various : Various | 0.071 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.071 | - |
| | | **Subtotal** | 0.071 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.071 | N/A |

| | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 209.167 | 12.879 | | 33.716 | | 0.000 | | - | | 0.000 | 0.000 | 255.762 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>2144 / *Space & Elec Warfare Engineering* |




*Notes:*

-Beginning in FY19, Space and Electronic Warfare (SEW) Engineering project (2144) resides under PE 0606355N.

-Based on changes in the threat environment and advances in technology, the development of cybersecurity architectures, specifications, and standards is a continuous process.

-The cross-Systems Command (SYSCOM) TAB occurs approximately once per quarter to review and endorse cybersecurity architectures, specifications, and standards that are applicable to all Navy Programs.

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>2144 / *Space & Elec Warfare Engineering* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 2144*** | | | | |
| Cybersecurity Specifications and Standards: Development | 1 | 2017 | 4 | 2018 |
| Cybersecurity Specifications and Standards: Technical Authority Board (TAB) Approval | 1 | 2017 | 4 | 2018 |
| Cybersecurity Architecture: Defense-in-Depth Functional Implementation Architecture (DFIA) Instantiations | 1 | 2017 | 4 | 2018 |
| Cybersecurity Vulnerability & Functional Test Capability: FY18 Procurement | 1 | 2018 | 4 | 2018 |
| Coalition Warrior Interoperability Demonstration/Coalition Warrior Interoperability Experiment (CWID/CWIX): Schedule as directed by the JMO during execution year | 1 | 2017 | 4 | 2018 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604707N / *SEW Architecture/Eng Support* | Project (Number/Name)<br>2147 / *ISR Architecture* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2147: *ISR Architecture* | 0.000 | 1.482 | 1.587 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 3.069 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Integrated architectures provide a technical framework for assessing capability gaps and performance of individual systems and System of Systems (SoS) and their ability to effectively provide the desired effects to support warfighting missions. They also serve as a means to influence and drive Programs of Record (PoR) toward a common, more efficient state that promotes interoperability and security.

The Naval Intelligence, Surveillance, and Reconnaissance (ISR) Reference Architecture project is intended to guide system of systems capability development and promote interoperability across Navy ISR programs, as well as interoperability and alignment with Department of Defense (DoD)-wide enterprise initiatives including Joint Information Environment and Intelligence Community Information Technology Environment and Space & Naval Warfare Systems Command-wide Enterprise Architecture policies. This effort to develop integrated ISR architectures will also help instill systems engineering discipline and standardization across the Navy ISR Enterprise and provide a means by which to assess ISR PoR progress in conforming to a single Navy architecture. These efforts will help reduce Information Technology/ISR infrastructure complexity and variances, making it easier to manage, operate and defend our ISR capabilities, and help inform investment decisions across the Navy's ISR enterprise to support Assured Command and Control, Battlespace Awareness and Integrated Fires.

This effort will encompass the documentation and analysis of current ISR enterprise architectures to inform and guide requirements for target architecture development and performance requirements to support full use and incorporation of ISR capabilities to advance Navy operations afloat. The associated studies will produce both technical and non-technical implementation guidance across the Doctrine, Organization, Training, Material, Leadership, Personnel and Facilities spectrum.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Intelligence, Surveillance, and Reconnaissance (ISR) Architecture | 1.482 | 1.587 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>-Continue to analyze the current ISR capabilities of afloat, ashore, joint, and national systems within mission contexts to demonstrate gaps and overlaps in Information Warfare capabilities and document in engineering artifacts and architectures. Perform trade space analysis and develop and quantify solutions using technical and operational performance parameters.<br>-Continue to build on the documentation and analysis of the enterprise ISR capabilities to support System of Systems (SoS) engineering assessments to identify integration and interoperability gaps, trades, and solutions to support investment decision-making across the ISR portfolio. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>2147 / *ISR Architecture* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| -Continue to integrate the National, Joint, and Naval ISR architectures within mission contexts to identify functional capacities, materiel integration and interoperability gaps and overlaps, as well as any policy and doctrine impacts.<br>-Continue to perform verification and validation (V&V) to ensure Intelligence, Surveillance, & Reconnaissance (ISR) architecture and analytic products accurately capture system performance specifications.<br>-Continue to capture all architectural data in the Space and Naval Warfare Systems Command (SPAWAR) analysis tool suite to support rigorous engineering assessments and architecture excursions against solution alternatives.<br>-Ensure alignment and interoperability between ISR Architectures and Joint Information Enterprise, Intelligence Community Information Technology Enterprise and SPAWAR Enterprise Architectures.<br>***FY 2019 Base Plans:***<br>FY19 ISR Architecture funding resides under PE 0606355N WARFARE INNOVATION MANAGEMENT.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Beginning in FY19, ISR Architecture funding profile transferred from PE 0604707N SEW ARCHITECTURE/ENG SUPPORT to PE 0606355N WARFARE INNOVATION MANAGEMENT. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 1.482 | 1.587 | 0.000 | 0.000 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The Naval ISR Architecture project is a non-acquisition program that provides integrated architecture products, engineering analysis of current and target/future capabilities to identify capability gaps and shortfalls, and provides solution recommendations. These combined efforts support the ability to articulate risks, and align/ prioritize investment decision recommendations within the ISR domain for the Navy.

**E. Performance Metrics**

The Naval (Navy and Marine Corps) ISR Reference Architecture effort will use consistent systems engineering practices to support development of integrated ISR enterprise architectures, and model-validated solution recommendations against quantified technical and operational performance parameters.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>2147 / *ISR Architecture* |

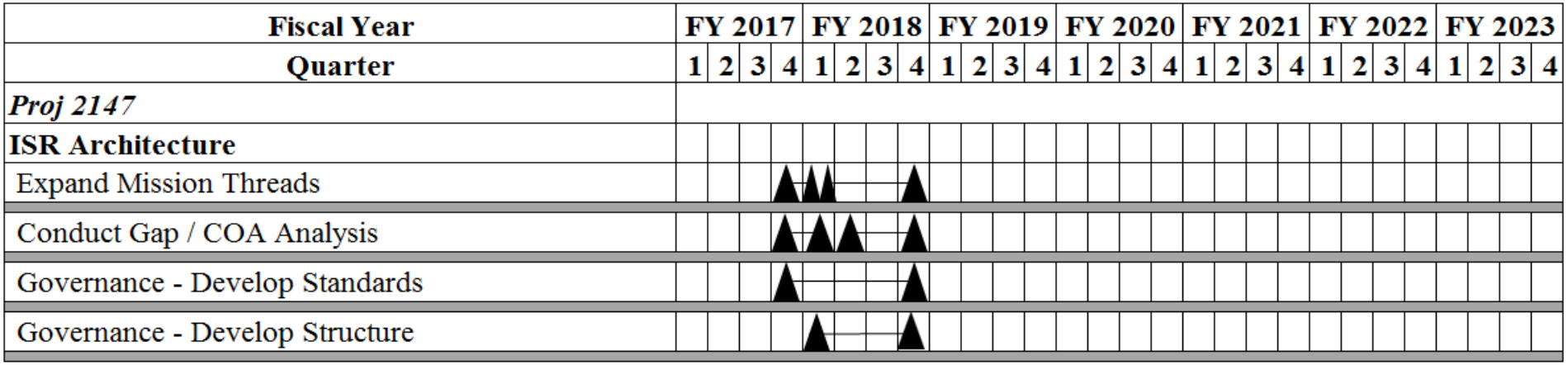
**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ISR Architecture | C/CPFF | METRON : Reston, VA | 0.000 | 1.382 | Jul 2017 | 1.480 | Dec 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| ISR Architecture | WR | SSC PAC : San Diego, CA | 0.000 | 0.100 | Jul 2017 | 0.107 | Dec 2017 | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 1.482 | | 1.587 | | 0.000 | | - | | 0.000 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 1.482 | | 1.587 | | 0.000 | | - | | 0.000 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>2147 / *ISR Architecture* |




*Notes:*

-Beginning in FY19, Intelligence, Surveillance, and Reconnaissance (ISR) Architecture project (2147) resides under PE 0606355N.

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>2147 / *ISR Architecture* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 2147*** | | | | |
| ISR Architecture: Expand Mission Threads | 4 | 2017 | 4 | 2018 |
| ISR Architecture: FY17 Conduct Gap / COA Analysis | 4 | 2017 | 1 | 2018 |
| ISR Architecture: FY18 Conduct Gap / COA Analysis | 2 | 2018 | 4 | 2018 |
| ISR Architecture: Governance - Develop Standards | 4 | 2017 | 4 | 2018 |
| ISR Architecture: Governance - Develop Structure | 1 | 2018 | 4 | 2018 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604707N / *SEW Architecture/Eng Support* | Project (Number/Name)<br>2356 / *Maritime Concept Generation & Development* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2356: *Maritime Concept Generation & Development* | 22.409 | 4.800 | 6.452 | 7.230 | - | 7.230 | 8.160 | 9.024 | 9.220 | 9.407 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Maritime Concept Generation and Development (MCGD) funding provides naval warfare subject matter expertise, experiment planning expertise, Modeling and Simulation (M&S) support, and analysis expertise to enable execution of the planned experiment efforts (and the individual experiment initiatives contained within) in the areas of Electromagnetic Maneuver Warfare (EMW), Mine Warfare, Naval Integrated Fires, and Unmanned systems and conduct experiments (war simulations, M&S, at-sea events) to develop emerging Naval concepts.
Typical deliverables for each experimental effort include:
- Experiment control plan
- Data Collection and Analysis Plan (DCAP)
- Experiment Analysis Summary Reference Document
- Experiment Engineering Plan
- Final Experiment Report (with doctrine, organization, training, materiel, leadership and education, personnel and facilities (DOTMLPF) recommendations)
- New/refined doctrine/Tactics, Techniques and Procedures (TTP).

The Maritime Concept Generation and Concept Development project funds four main efforts:
(1) Provides critical concept development and experimentation manpower and warfighting subject matter expertise aligned with the Concept Generation/Concept Development (CG/CD) program. The priorities for the CG/CD program are to develop concept/concept of operations and explore near/far-term technological and non-technological solutions to war fighting gaps across all naval warfare areas. The associated experimentation efforts include planning, systems engineering and integration, modeling and simulation support, event execution, data collection, analysis, and assessment for a wide-range of experimentation efforts including the examination of prototypes, tactical development and evaluation, support for Science and Technology (S&T) innovation, and program of record system development; venues such as workshops, seminars, war games, limited objective experiments, limited technical experiments, and live at-sea events are used to execute these experimentation efforts.
(2) Provides naval warfare subject matter expertise, experiment planning expertise, and analysis expertise who plans, executes, and assesses experimentation for the fleets and warfighting development centers (WDC) at the operational and tactical levels. This includes a focus on WDC integration role, maritime command and control (C2), advanced cross-domain warfighting, and maritime operations centers (MOCS)/operational level of war (OLW) lines of operations. Seeks to solve fleet-identified warfighting gaps (referenced within the Integrated Prioritized Capability Lists (IPCL), Urgent Operational Needs Statements (UONS), Fleet Commander's Guidance, etc.). The experimentation and prototyping efforts support the "last tactical mile" of many Navy S&T programs by supporting those programs where the technology is mature enough, but requires evaluation on or by a "fleet asset" - ships, airplanes, submarines, and sailors.
(3) Provides modeling and simulation (M&S) support to Navy experimentation efforts. M&S is used to stimulate decision making during seminar-style and system war gaming experiments and provides the simulated operational environment and capabilities with high-fidelity models such as the Joint Semi-Automated Force (JSAF)

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>2356 / *Maritime Concept Generation & Development* |

program. Additionally, where applicable, the Navy Simulation System (NSS) "Monte Carlo" model is also used to give high confidence solutions and outcomes to complex warfighting problems.
(4) Provides for focused, solution-driven tactics development and evaluation through experimentation. This effort is focused on developing near-term doctrine solutions to address specific fleet-identified tactical issues.

Maritime Concept Generation and Concept Development products include:
- Enabling concepts
- Concepts of operations (CONOPS)
- Final experiment reports (including findings, insights, and recommendations and DOTMLPF change recommendations and plans for action)
- Experiment Analysis Summary Reference Documents
- New/revised doctrinal and Tactics/Techniques/Procedures publications
- White papers (think pieces) intended to generate further discussion within Navy leadership

Specific products are listed in the Accomplishments/Plans section of this exhibit.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Maritime Concept Generation and Development | 4.800 | 6.452 | 7.230 | 0.000 | 7.230 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>FY 2018 experiment efforts through MCGD; Navy will provide experiment, analytical and naval mission subject matter expertise support throughout the planning and execution process; identify fleet warfighting deficiencies through experimentation; identify and capture innovative solutions for fleet experiments that address prioritized fleet warfighting gaps; and identify suitable events to support the execution of the following Experimentation Campaigns:<br>ELECTROMAGNETIC MANEUVER WARFARE (EMW) EXPERIMENTATION<br>Navy will conduct multiple events designed to synchronize and align experiment initiatives with EMW campaign tasks to provide solutions to EMW capability gaps and to ensure development of doctrine is synchronized with the introduction of new technology in order to provide the Fleet and Fleet trainers with required capabilities at the tactical and operational levels.<br>RIMPAC 18 AT-SEA EXPERIMENT - This event will leverage the fleet assets and at-sea time associated with a major training exercise, Rim of the Pacific (RIMPAC) 2018. The effort will evaluate technology and/or Tactics, Techniques, Procedures (TTP) related initiatives to close warfighting gaps identified across multiple POM-19 Integrated Prioritized Capability Lists (IPCLs).<br>SPECTRAL TSUNAMI 2018 SEMINAR WAR SIMULATION - This effort is comprised of stakeholders from across the Navy to define the baseline warfighting scenario and existing technical capabilities to form an | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>2356 / *Maritime Concept Generation & Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Integrated Technical Capabilities Baseline (ITCB). The war simulation will identify areas of strengths and weaknesses, areas for improving operational effectiveness and hardware/software changes necessary to improve existing POR systems or suggest requirements for new capability. Following completion, the simulation output will be injected into the Naval Simulation System (NSS) for advanced modeling and simulation to quantify the tactical and operational impact of multiple proposed PoR and S&T solutions and innovative employment methods. The war simulation will build upon the results of the 2017 war simulation and the scope will be expanded to include select coalition capabilities.<br>NETTED SENSORS AT-SEA EXPERIMENT - This continued effort at operationalizing the Fleet Tactical Grid will leverage STORMFORCE 2018, a National Security Agency (NSA)-sponsored Five Eyes tactical signals intelligence (SIGINT) interoperability-focused experiment to examine and enhance integration and interoperability of sensors, networks, data fusion, and analytic capabilities across national, theater, and organic platforms.<br>STRIKE GROUP-ORGANIC, LONG ENDURANCE UNMANNED AERIAL VEHICLE (UAV) experiment - This experiment effort will examine the employment of long endurance UAVs organic to a Carrier or Expeditionary Strike Group - a capability that will provide unit level ships with the ability to transport Intelligence, Surveillance, and Reconnaissance (ISR) and strike payloads long distances from the host platform.<br>BLUE EMITTER VULNERABILITY ASSESSMENT (BEVA) - This classified effort will be an in-depth examination of U.S. Navy system vulnerabilities.<br>COUNTER-ISR WAR SIMULATION - This classified modeling and simulation supported war simulation will be an examination of the employment of emerging TTPs and technologies in support of Distributed Maritime Operations.<br>OFFICE OF NAVAL RESEARCH (ONR) TECHNOLOGY INNOVATION GAMES (TIGS). This series of workshops executed in conjunction with ONR will give Fleet operators the opportunity to examine emerging capabilities and determine potential concepts of employment to effectively incorporate innovative capabilities into Fleet warfighting missions and tasks. Potential technology being examined include: High Power Joint Electromagnetic Non-Kinetic Strike (HIJENKS); Medium Displacement Unmanned Surface Vessel (MDUSV) Anti-Submarine Warfare (ASW) Concept of Employment; Unmanned Systems (UxS) Defensive Actions; and Forward Deployed Energy & Communications Outpost (FDECO).<br>ASSURED COMMAND AND CONTROL (AC2) AT SEA EXPERIMENT - This effort will likely leverage the naval assets and at-sea time to conduct an extended evaluation of an emerging technology in support of EMW objectives.<br>TECHNOLOGY/TTP EXPERIMENT - This experiment will refine TTP and technical requirements to employ a classified Navy Tactical Exploitation of National Capabilities (TENCAP) developed capability. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>2356 / *Maritime Concept Generation & Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| CYBER DEFENSE WAR SIMULATION AND/OR AT SEA EXPERIMENT - This classified effort will build upon prior year experiments to further examine US Navy vulnerabilities to adversary cyber threats.<br>COUNTER-UNMANNED SYSTEMS EXPERIMENT SERIES - This effort will build upon the 2017 counter-UAV experiment by examining emerging TTPs and technologies to counter the proliferation of unmanned undersea, surface, and air vehicles.<br>NAVAL FORCE INTEGRATION EXPERIMENTATION<br>Naval Force Integration experimentation will examine integration and interoperability issues associated with coordinated USN-USMC operations. The primary goal is to reexamine Navy and Marine Corps organizational and command relationships in order to enable effective Naval operations across the maritime domain.<br>LITTORAL OPERATIONS IN A CONTESTED ENVIRONMENT (LOCE) War Simulation - This simulation will focus on operational level objectives and examine how a Navy Commander task organizes to achieve sea control in complex, contested environments.<br>F-35B BLOCK 3F FIRST DEPLOYMENT INITIATIVE War Simulation - This effort will employ a combination of vignettes augmented with an integrated limited virtual constructive environment. Scenarios will be planned, briefed and executed in a limited virtual, constructive environment.<br>MINE WARFARE (MIW) EXPERIMENTATION<br>Through workshops, war simulation and at-sea events, the FY 18 efforts will continue to examine TTP and Command and Control (C2) construct for our future Mine Counter-Measures (MCM) force as new programs of record and unmanned systems come on line, and legacy systems begin to decommission.<br>MCM WAR SIMULATION AND/OR AT SEA EXPERIMENT - This effort will examine current and planned Navy MCM equipment (manned and unmanned) and evaluate concepts of employment with an overall goal of developing a product that merges overall Navy requirements.<br>MCM EXPERIMENT - In support of C6F, this experiment will look at MCM C2 and capability to execute requirements.<br>OPERATIONAL LEVEL OF WAR/TACTICAL LEVEL OF WAR (OLW/TLW) INTEGRATION EXPERIMENTATION<br>Another CUSFF/CPF designated focus area for experimentation in 2018, OLW/TLW Integration experiments will examine current and emerging tactics, techniques, and procedures (TTPs) and current and emerging technologies with a goal of identifying innovative solutions that will support the capstone naval concept of a Fleet Design based on integration, distribution, and maneuver.<br>NAVAL INTEGRATED FIRES ELEMENT (NIFE) War Simulation - This effort will examine and refine a draft NIFE Tactical Memorandum (TACMEMO) to facilitate transition of TTP to formal doctrine and development | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>2356 / *Maritime Concept Generation & Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| of training requirements at the operational level of war (OLW) and tactical level of war (TLW) in support of enhanced maritime targeting capabilities.<br>SPACE WAR SIMULATION - This effort will build upon the findings and recommendations of the 2017 war simulation in order to further explore the optimization of space-based capabilities in support of the maritime environment.<br>EMERGING CONCEPTS WAR SIMULATION(S) - This effort will employ multiple seminar war simulations to examine emerging concepts such as Fleet Design, Distributed Maritime Operations, and multiple feeder concepts. | | | | | |
| ***FY 2019 Base Plans:***<br>FY 2019 experiment efforts through MCGD; Navy will continue to provide experiment, analytical and naval mission subject matter expertise support throughout the planning and execution process; identify fleet warfighting deficiencies through experimentation; identify and capture innovative solutions for fleet experiments that address prioritized fleet warfighting gaps; and identify suitable events to support the execution of the following Experimentation Campaigns:<br>FLEET DESIGN EXPERIMENTS<br>In keeping with the CNO's Design for Maintaining Maritime Superiority, the emerging concept "Fleet Design" has been developed. Continuing the development of the supporting doctrine, Tactics, Techniques & Procedures (TTP), Command and control (C2) as well as the integration and interoperability required between weapon systems and decision makers requires a methodical experimental approach. FY 19 experiments (both at-sea and via war simulation) will strive to achieve the objectives as laid out in the accompanying action/ implementation plan.<br>ELECTROMAGNETIC MANEUVER WARFARE (EMW) EXPERIMENTATION<br>Navy will conduct multiple events designed to synchronize and align experiment initiatives with EMW tasks to provide solutions to EMW capability gaps and to ensure development of doctrine and TTP is synchronized with the introduction of new technology and provides the Fleet and Fleet trainers with required doctrine tools at the tactical and operational levels.<br>EMW TECHNOLOGY War Simulation - This effort is comprised of stakeholders from across the Navy to define the baseline warfighting scenario and existing technical capabilities to form an Integrated Technical Capabilities Baseline (ITCB). The war simulation will identify areas of strengths and weaknesses, areas for improving operational effectiveness and hardware/software changes necessary to improve existing POR systems or suggest requirements for new capability. Following completion, the simulation output will be injected into the | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>2356 / *Maritime Concept Generation & Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Naval Simulation System (NSS) for advanced modeling and simulation to quantify the tactical and operational impact of various proposed solutions and innovative employment methods.<br>NETTED SENSORS At-Sea Experiment - This effort will examine and enhance the integration and interoperability of sensors, networks, data fusion, and analytic capabilities across national, theater, and organic platforms to explore the vision for a Fleet Tactical Grid.<br>EMW At Sea Experiment - This effort will examine emerging EMW-related technologies with the most potential, as identified during the EMW technology series of war games, in an at-sea environment in order to inform future investment decisions and to support the rapid introduction of potentially game-changing capabilities.<br>OFFICE OF NAVAL RESEARCH (ONR) TECHNOLOGY INNOVATION GAMES (TIGS). This series of workshops executed in conjunction with ONR will give Fleet operators the opportunity to examine emerging capabilities and determine potential concepts of employment to effectively incorporate innovative capabilities into Fleet warfighting missions and tasks.<br>NAVAL FORCE INTEGRATION EXPERIMENTATION<br>Naval Force Integration experiments (workshops, war simulations, and at-sea events) will examine integration and interoperability issues associated with coordinated USN-USMC operations. The primary goal of the campaign is to reexamine Navy and Marine Corps organizational and command relationships in order to enable effective Naval operations across the maritime domain.<br>MINE WARFARE (MIW) EXPERIMENTATION<br>Through workshops, war simulation and at-sea events, the FY 19 efforts will continue to examine TTP and C2 construct for our future MCM force as new programs of record and unmanned systems come on line, and legacy systems begin to decommission.<br>OPERATIONAL LEVEL OF WAR/TACTICAL LEVEL OF WAR (OLW/TLW) INTEGRATION EXPERIMENTATION<br>OLW/TLW Integration experiments (workshops, war simulation and at-sea events) will examine current and emerging tactics, techniques, and procedures (TTPs) and current and emerging technologies with a goal of identifying innovative solutions that will support the capstone naval concept of a Fleet Design based on integration, distribution, and maneuver.<br>EMERGING CONCEPTS WAR SIMULATION(S) - This effort will employ multiple seminar war simulations to examine emerging concepts such as Fleet Design, Distributed Maritime Operations, and multiple feeder concepts.<br>FOR FY 19 CONCEPT GENERATION/CONCEPT DEVELOPMENT<br>Continue CG/CD development efforts that carry-over from FY 2018: | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>2356 / *Maritime Concept Generation & Development* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Navy will finish enabling concepts for Fleet Design. This includes development of the Distributed Maritime Operations concept (DMO).<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>The increase from FY18 to FY19 is due to the rapid development of resilient war fighting capabilities to ensure the Navy can operate confidently and fight decisively with our weapons and systems. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 4.800 | 6.452 | 7.230 | 0.000 | 7.230 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

This funding is used to acquire intellectual capital in emerging conceptual and technical areas through contracts providing expertise in concepts and experiment design, execution and analysis to mitigate fleet-identified current and future war fighting gaps.

**E. Performance Metrics**

Maritime Concept Generation and Development/Related Experimentation:
- Integrate emergent concepts and technologies, leading to rapid introduction of needed war fighting capabilities.
- Rapidly mature concepts, technologies, and doctrine.
- Develop near-term doctrine solutions to address specific fleet-identified tactical level / operation level issues
- Develop recommended Doctrine, Organization, Training, Materiel, Leadership, and Personnel (DOTMLP) changes required to introduce emergent technology and tactics.
- Refine concepts and identify key performance levels necessary for implementation.
- Demonstrate feasibility and discriminate among competing concepts and implementation alternatives.
- Identify potential military effectiveness and risk.
- Evaluate how much of the new capability and attendant force structure is needed.
- Identify how to operate the new force and combine it with the legacy force.
- Focus on near, mid and long term war fighting challenges to realize increased war fighting effectiveness.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>2356 / *Maritime Concept Generation & Development* |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| System Test and Evaluation | C/CPFF | Defense Technical Information Center : Ft Belvoir VA | 10.271 | 2.442 | Dec 2016 | 4.026 | Dec 2017 | 4.148 | Jan 2019 | - | | 4.148 | Continuing | Continuing | Continuing |
| System Test and Evaluation | Various | SPAWARSYSCEN : Charleston, SC | 2.734 | 0.000 | Nov 2016 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| System Test and Evaluation | Various | ONR : Washington, DC | 1.370 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| System Test and Evaluation | Various | NAVSEA : Washington, DC | 1.334 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.334 | - |
| System Test and Evaluation | WR | Naval Underwater Warfare Center : Newport RI | 0.500 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.500 | - |
| System Test and Evaluation | C/CPFF | NAVSUP : Norfolk VA | 3.490 | 2.204 | Dec 2016 | 2.426 | Dec 2017 | 3.082 | Dec 2018 | - | | 3.082 | 0.000 | 11.202 | - |
| Center for Naval Analysis | IA | Center for Naval Analysis : Norfolk, VA | 0.000 | 0.154 | Nov 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.154 | - |
| | | **Subtotal** | 19.699 | 4.800 | | 6.452 | | 7.230 | | - | | 7.230 | Continuing | Continuing | N/A |

**Remarks**

The vast majority of the contract costs are for contract labor; primarily on two large Multi-Award contracts, one through DTIC (Defense Services MAC) and one through Joint Staff J-7 MAC. Task orders on the DS MAC contract provide the majority of the Modeling & Simulation support for experimentation and some of the experiment planner support. Task orders on the JS J-7 MAC provide the majority of the experiment design, planner, and execution support.

**Management Services ($ in Millions)**

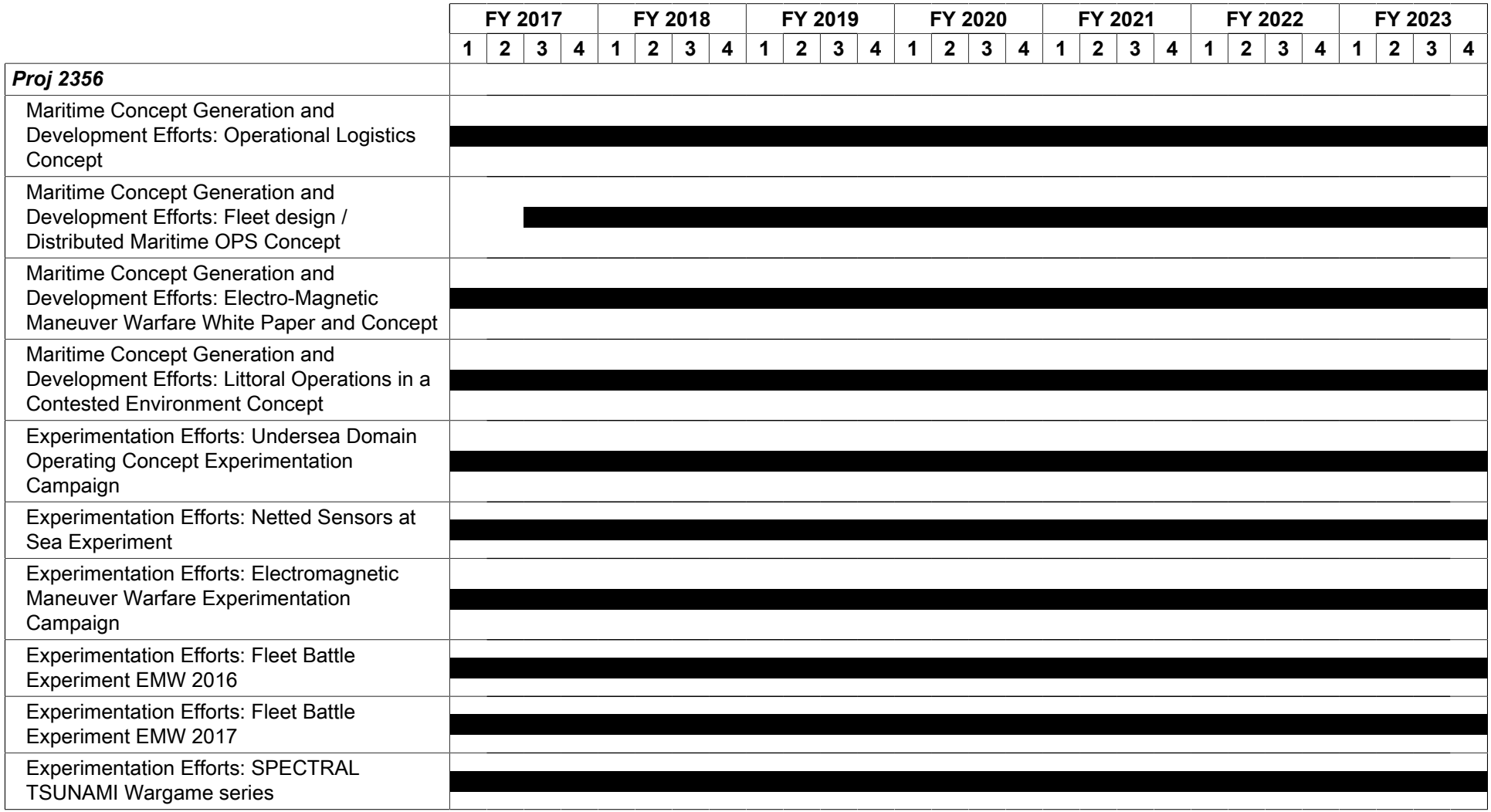
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management | C/FFP | Navy Warfare Development Command : Norfolk, VA | 2.710 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.710 | - |
| | | **Subtotal** | 2.710 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.710 | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0604707N / *SEW Architecture/Eng Support* | Project (Number/Name)<br>2356 / *Maritime Concept Generation & Development* | |

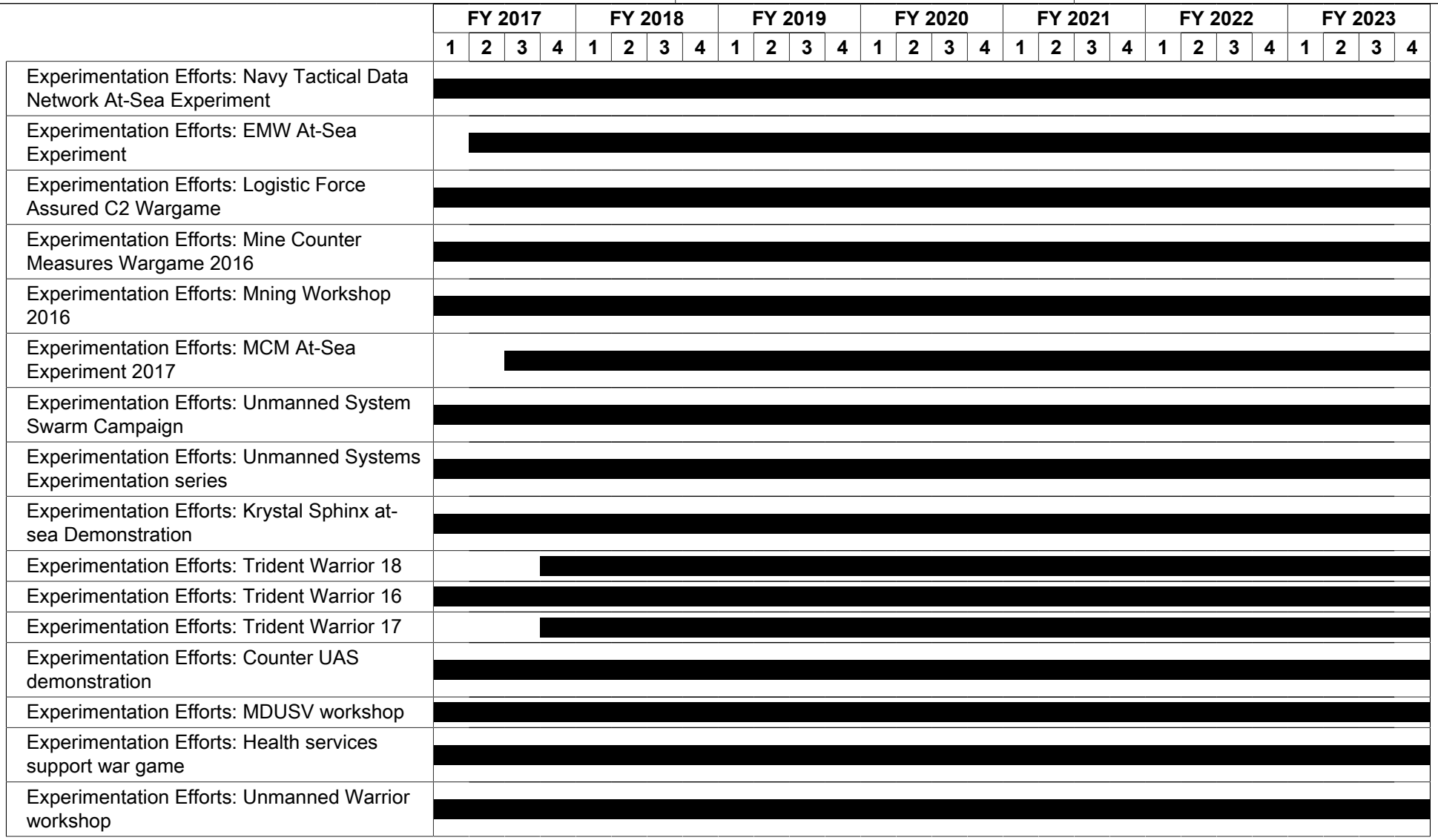
| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 22.409 | 4.800 | | 6.452 | | 7.230 | | - | | 7.230 | Continuing | Continuing | N/A |

**Remarks**

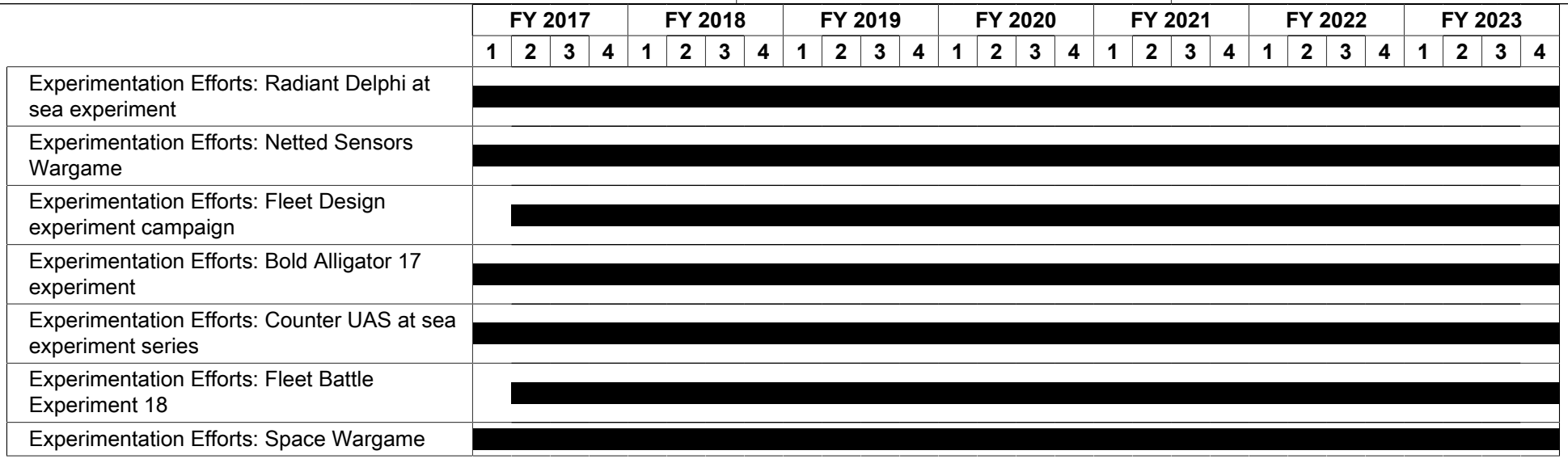
| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>2356 / *Maritime Concept Generation & Development* |



| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>2356 / *Maritime Concept Generation & Development* |



| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>2356 / *Maritime Concept Generation & Development* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>2356 / *Maritime Concept Generation & Development* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 2356*** | | | | |
| Maritime Concept Generation and Development Efforts: Operational Logistics Concept | 1 | 2017 | 4 | 2023 |
| Maritime Concept Generation and Development Efforts: Fleet design / Distributed Maritime OPS Concept | 3 | 2017 | 4 | 2023 |
| Maritime Concept Generation and Development Efforts: Electro-Magnetic Maneuver Warfare White Paper and Concept | 1 | 2017 | 4 | 2023 |
| Maritime Concept Generation and Development Efforts: Littoral Operations in a Contested Environment Concept | 1 | 2017 | 4 | 2023 |
| Experimentation Efforts: Undersea Domain Operating Concept Experimentation Campaign | 1 | 2017 | 4 | 2023 |
| Experimentation Efforts: Netted Sensors at Sea Experiment | 1 | 2017 | 4 | 2023 |
| Experimentation Efforts: Electromagnetic Maneuver Warfare Experimentation Campaign | 1 | 2017 | 4 | 2023 |
| Experimentation Efforts: Fleet Battle Experiment EMW 2016 | 1 | 2017 | 4 | 2023 |
| Experimentation Efforts: Fleet Battle Experiment EMW 2017 | 1 | 2017 | 4 | 2023 |
| Experimentation Efforts: SPECTRAL TSUNAMI Wargame series | 1 | 2017 | 4 | 2023 |
| Experimentation Efforts: Navy Tactical Data Network At-Sea Experiment | 1 | 2017 | 4 | 2023 |
| Experimentation Efforts: EMW At-Sea Experiment | 2 | 2017 | 4 | 2023 |
| Experimentation Efforts: Logistic Force Assured C2 Wargame | 1 | 2017 | 4 | 2023 |
| Experimentation Efforts: Mine Counter Measures Wargame 2016 | 1 | 2017 | 4 | 2023 |
| Experimentation Efforts: Mning Workshop 2016 | 1 | 2017 | 4 | 2023 |
| Experimentation Efforts: MCM At-Sea Experiment 2017 | 3 | 2017 | 4 | 2023 |
| Experimentation Efforts: Unmanned System Swarm Campaign | 1 | 2017 | 4 | 2023 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604707N / *SEW Architecture/Eng Support* | **Project (Number/Name)**<br>2356 / *Maritime Concept Generation & Development* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Experimentation Efforts: Unmanned Systems Experimentation series | 1 | 2017 | 4 | 2023 |
| Experimentation Efforts: Krystal Sphinx at-sea Demonstration | 1 | 2017 | 4 | 2023 |
| Experimentation Efforts: Trident Warrior 18 | 4 | 2017 | 4 | 2023 |
| Experimentation Efforts: Trident Warrior 16 | 1 | 2017 | 4 | 2023 |
| Experimentation Efforts: Trident Warrior 17 | 4 | 2017 | 4 | 2023 |
| Experimentation Efforts: Counter UAS demonstration | 1 | 2017 | 4 | 2023 |
| Experimentation Efforts: MDUSV workshop | 1 | 2017 | 4 | 2023 |
| Experimentation Efforts: Health services support war game | 1 | 2017 | 4 | 2023 |
| Experimentation Efforts: Unmanned Warrior workshop | 1 | 2017 | 4 | 2023 |
| Experimentation Efforts: Radiant Delphi at sea experiment | 1 | 2017 | 4 | 2023 |
| Experimentation Efforts: Netted Sensors Wargame | 1 | 2017 | 4 | 2023 |
| Experimentation Efforts: Fleet Design experiment campaign | 2 | 2017 | 4 | 2023 |
| Experimentation Efforts: Bold Alligator 17 experiment | 1 | 2017 | 4 | 2023 |
| Experimentation Efforts: Counter UAS at sea experiment series | 1 | 2017 | 4 | 2023 |
| Experimentation Efforts: Fleet Battle Experiment 18 | 2 | 2017 | 4 | 2023 |
| Experimentation Efforts: Space Wargame | 1 | 2017 | 4 | 2023 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0604786N *I (U)Offensive Anti-Surface Warfare Weapon Dev* |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Program Element | 694.719 | 301.554 | 160.694 | 143.062 | - | 143.062 | 51.051 | 0.000 | 0.000 | 0.000 | 0.000 | 1,351.080 |
| 3337: *Offensive Anti-Surface Warfare (OASuW) Weapon* | 694.719 | 301.554 | 160.694 | 143.062 | - | 143.062 | 51.051 | 0.000 | 0.000 | 0.000 | 0.000 | 1,351.080 |

**Program MDAP/MAIS Code:**
**Project MDAP/MAIS Code(s):** P449

**A. Mission Description and Budget Item Justification**

Offensive Anti-Surface Warfare (OASuW) will be an offensive weapon system that can be air, surface, and subsurface launched in the maritime battle space environment. OASuW will be a vital component of the Joint Force Anti-Surface Warfare capability and incorporate new and emergent technologies to support an increased offensive strike capability. Due to emerging threats, the fleet issued an Urgent Operational Needs Statement (UONS) that identified a capability gap for a long-range anti-ship missile to be filled by 2018. Directly supporting this UONS and significantly reducing Joint Force warfighting risks, the U.S. Navy initiated OASuW Increment 1 (OASuW-1), which leverages the Defense Advanced Research Projects Agency(DARPA)/Office of Naval Research Long Range Anti-Ship Missile (LRASM) demonstration program to deliver an Early Operational Capability (EOC) in the required timeframe. LRASM fills the most urgent air-launched capability gap to compliment, existing ASuW weapon systems and positions the Department of Defense to address evolving surface warfare threats.

The OASuW program is part of the Navy's Integrated Fire Control (IFC) approach to address advanced threat capabilities in the Anti-Access/Area-Denial (A2AD) environment. IFC solutions enable individual system capabilities to be leveraged across an effects chain, placing the full spectrum of tactical capability in the hands of the warfighter. IFC solutions that push engagement distances beyond the launch platform's radar horizon and allows the U.S. Navy to operate in, and control, contested battle space in littoral waters and A2/AD environments are increasingly critical as more and more scenarios require compressed and coordinated fire control timelines.

Budget Item Justification: OASuW-1
Funding supports the delivery of an EOC of OASuW-1 LRASM weapon system, including the transition of the LRASM demonstration design into a fielded air-launched weapon system, using an accelerated acquisition approach, with streamlined governance. The program is leveraging DoDI 5000.02i Model 4 to structure the acquisition strategy, which includes a highly integrated and concurrent transition design, integration, and developmental / operational test program to meet the EOC schedule required by the UONS. To manage the accelerated timeline and resulting concurrency, the program uses a structured Knowledge Point review process that support decisions regarding significant program events such as transition from design to integration phase and contract awards. These reviews also provide senior DoD leadership the opportunity to provide focused support and active management of technical and acquisition risk and are chaired by the Service Acquisition Executive, ASN(RDA). The knowledge points are similar to acquisition milestone reviews, but occur more frequently and are tailored to program-specific milestone events. Of note, the OASuW Increment I knowledge points are defined differently than GAO defines the same term and are tailored to program-specific milestone events. The program met statutory requirements associated with Milestone B at Knowledge Point 3. In addition to the Knowledge Point reviews, Executive Steering Board reviews, chaired by the MDA, are held at least monthly. Supporting these reviews, the associated engineering approach is designed to mitigate resulting risk by implementing a rolling-wave engineering progression based on the NAVAIR Systems Engineering Technical Review (SETR) process to enable detailed planning and decisions as the system

matures. This process includes capstone SETR events that are tailored reviews using standard design review criteria. The Technology Maturation efforts in FY 2015 through FY 2017 culminated in a system level Critical Design Review (CDR) level review at SETR 4.0. SETR 3.0 in 4QFY 2015 provided a CDR-level review to support the Knowledge Point 3 decision to initiate the Integration and Test phase for the All Up Round components. SETR 5.0 held in 1QFY 2017 to support Knowledge Point 4 obtained MDA to enter into production.

This program is funded under ADVANCED COMPONENT DEVELOPMENT AND PROTOTYPES because it includes all efforts necessary to evaluate integrated technologies, representative models or prototype systems in a high fidelity and realistic operating environment.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 313.109 | 160.694 | 64.725 | - | 64.725 |
| Current President's Budget | 301.554 | 160.694 | 143.062 | - | 143.062 |
| Total Adjustments | -11.555 | 0.000 | 78.337 | - | 78.337 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -9.517 | 0.000 | | | |
| • Program Adjustments | -50.600 | 0.000 | 0.000 | - | 0.000 |
| • Rate/Misc Adjustments | 0.000 | 0.000 | 78.337 | - | 78.337 |
| • Congressional Directed Reductions Adjustments | -2.038 | - | - | - | - |
| • Congressional Add Adjustments | 50.600 | - | - | - | - |

**Change Summary Explanation**

The FY 2019 funding request was reduced by $0.007 million to reflect the Department of Navy's effort to support the Office of Management and Budget directed reforms for Efficiency and Effectiveness that include a lean, accountable, more efficient government.

FY 2019 miscellaneous adjustment of $78M from previous President's Budget to current President's Budget is supports the continued OASuW Increment 1 development to ensure tactical dominance for the warfighter over a longer period of time by providing sanctuary employment against capital warships. This continued development expands the mission set to address evolving, persistent and dynamic threats and continues to fill gaps in strike warfare.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | | | | | R-1 Program Element (Number/Name)<br>PE 0604786N / *(U)Offensive Anti-Surface Warfare Weapon Dev* | | | | Project (Number/Name)<br>3337 / *Offensive Anti-Surface Warfare (OASuW) Weapon* | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| 3337: *Offensive Anti-Surface Warfare (OASuW) Weapon* | 694.719 | 301.554 | 160.694 | 143.062 | - | 143.062 | 51.051 | 0.000 | 0.000 | 0.000 | 0.000 | 1,351.080 |
| Quantity of RDT&E Articles | 12 | 1 | - | - | - | - | - | - | - | - | | |

**Project MDAP/MAIS Code:** P449

**A. Mission Description and Budget Item Justification**

Offensive Anti-Surface Warfare (OASuW) will be an offensive weapon system that can be air, surface, and subsurface launched in the maritime battle space environment. OASuW will be a vital component of the Joint Force Anti-Surface Warfare capability and incorporate new and emergent technologies to support an increased offensive strike capability. Due to emerging threats, the fleet issued an Urgent Operational Needs Statement (UONS) that identified a capability gap for a long-range anti-ship missile to be filled by 2018. Directly supporting this UONS and significantly reducing Joint Force warfighting risks, the U.S. Navy initiated OASuW Increment 1, which leverages the Defense Advanced Research Projects Agency(DARPA)/Office of Naval Research Long Range Anti-Ship Missile (LRASM) demonstration program to deliver an Early Operational Capability (EOC) in the required timeframe. LRASM fills the most urgent air-launched capability gap to compliment, existing ASuW weapon systems and positions the Department of Defense to address evolving surface warfare threats.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** OASuW Development Program | 301.554 | 160.694 | 143.062 | 0.000 | 143.062 |
| ***Articles:*** | 1 | - | - | - | - |
| ***FY 2018 Plans:***<br>The Integration and Test phase of the program will continue in FY 2018 focusing on B-1 fielding and completion of F/A-18 integration including carrier suitability testing. The final test assets will be delivered in FY 2018. The missile firings and associated modeling and simulation effort will continue the system performance test program. The program will complete Knowledge Point 5 in support of the Lot 2 procurement. USAF EOC will be achieved on the B-1 (SETR 7.0) with Knowledge Point 6. | | | | | |
| ***FY 2019 Base Plans:***<br>The Integration and Test phase of the program will continue in FY 2019. The program will complete Knowledge Point 7 in support of the Lot 3 procurement. USN EOC will be achieved on the F/A-18 (SETR 8.0) with Knowledge Point 8. Continued OASuW Increment 1 development (LRASM capability improvements) added to ensure tactical dominance for the warfighter over a longer period of time by providing sanctuary employment | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604786N / *(U)Offensive Anti-Surface Warfare Weapon Dev* | **Project (Number/Name)**<br>3337 / *Offensive Anti-Surface Warfare (OASuW) Weapon* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| against capital warships. This continued development expands the mission set to address evolving, persistent and dynamic threats and continues to fill gaps in strike warfare.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Decreasing due to progression in developmental efforts. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 301.554 | 160.694 | 143.062 | 0.000 | 143.062 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • WPN/2291: *LRASM* | 54.343 | 74.733 | 81.190 | - | 81.190 | 74.201 | 75.000 | 0.000 | 0.000 | 0.000 | 359.467 |
| • MPAF/8010: *LRASM* | 71.411 | 44.728 | 44.581 | - | 44.581 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 160.720 |

**Remarks**

U.S. Navy WPN funding supports the following quantities:

FY17 - 15
FY18 - 25
FY19 - 25
FY20 - 25
FY21 - 25

U.S. Air Force MPAF funding supports the following quantities:

FY17 - 19
FY18 - 12
FY19 - 12

**D. Acquisition Strategy**

OASuW-1 is using an accelerated acquisition approach, with streamlined governance to transition the DARPA/ONR-demonstrated Long Range Anti-Ship Missile (LRASM) for use as an air-launched weapon from USAF and USN platforms. The program is leveraging DoDI 5000.02i Model 4 to structure the acquisition strategy,

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604786N / *(U)Offensive Anti-Surface Warfare Weapon Dev* | **Project (Number/Name)**<br>3337 / *Offensive Anti-Surface Warfare (OASuW) Weapon* |

which includes a highly integrated and concurrent transition design, integration, and developmental / operational test program to meet the 2018 Early Operation Capability (EOC) fielding schedule required by an Urgent Operational Need Statement (UONS) issued by the fleet. The program is structured in three phases: Technology Maturation, Integration and Test, and Procurement. To manage the accelerated timeline and resulting concurrency, the program uses a structured Knowledge Point review process that support decisions regarding significant program events such as transition from design to integration phase and contract awards. These reviews also provide senior DoD leadership the opportunity to provide focused support and active management of technical and acquisition risk and are chaired by the Service Acquisition Executive, ASN(RDA) (delegated MDA), and the Deputy Director of DARPA. The knowledge points are similar to acquisition milestone reviews, but occur more frequently. Of note, the OASuW-1 knowledge points are defined differently than GAO defines the same term. Knowledge Point 1 supported program initiation and approval of the acquisition strategy ; Knowledge Point 2 supported evaluation of the preliminary design of the weapon system as well as release of the Request for Proposal for the Integration and Test phase; Knowledge Point 3 supported evaluation of the final (critical design review level) weapon system design and initiation of/contract award for the Integration and Test phase; Knowledge Point 4 supports the procurement decision for Lot 1 EOC units; and Knowledge Point 5 supports Lot 2 procurement, Knowledge Point 6 supports USAF EOC decision, Knowledge Point 7 supports Lot 3 procurement and Knowledge Point 8 supports USN EOC decision. The program intends to meet the statutory requirements associated with Milestone B at Knowledge Point 3. In addition to the Knowledge Point reviews, Executive Steering Board reviews (also chaired by the MDA) are held at least monthly. Supporting these reviews, the associated engineering approach is designed to mitigate resulting risk by implementing a rolling-wave engineering progression based on the NAVAIR Systems Engineering Technical Review (SETR) process to enable detailed planning and decisions as the system matures. This process includes capstone SETR events that are tailored reviews using standard design review criteria. SETR 1.0 in FY 2014 provided a Systems Requirements Review. SETR 2.0 in FY 2015 provided a Preliminary Design Review level review of the system and supported Knowledge Point 2. SETR 3.0 in late 2015 provided a Critical Design Review (CDR) level review of the All Up Round in support of
Knowledge Point 3, while SETR 4.0 in FY 2016 provided a CDR level review of the entire weapon system in support of Knowledge Point 4 in early FY 2017, along with flight test information.

**E. Performance Metrics**

The Knowledge Points are defined reviews with the Executive Steering Board comprised of Service Acquisition Executive, ASN(RDA) (delegated MDA) and the Deputy Director of DARPA to make program decisions at key points in the program life cycle in place of milestone reviews, but tailored to support the accelerated process. The acquisition program baseline was established at Knowledge Point 3.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604786N / *(U)Offensive Anti-Surface Warfare Weapon Dev* | **Project (Number/Name)**<br>3337 / *Offensive Anti-Surface Warfare (OASuW) Weapon* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Product Development | C/CPIF | Lockheed Martin Missile and Fire Control : Orlando, FL | 517.355 | 216.034 | Oct 2016 | 112.792 | Oct 2017 | 89.185 | Oct 2018 | - | | 89.185 | 0.000 | 935.366 | 877.192 |
| Product Development | C/CPFF | Boeing : St. Louis, MO | 39.540 | 20.323 | Oct 2016 | 3.254 | Oct 2017 | 4.944 | Oct 2018 | - | | 4.944 | 0.000 | 68.061 | 65.561 |
| | | **Subtotal** | 556.895 | 236.357 | | 116.046 | | 94.129 | | - | | 94.129 | 0.000 | 1,003.427 | N/A |

**Remarks**

FY 2019 Lockheed Martin Company (LMCO) costs includes all integration and test efforts, including increased LRASM capability improvements development, by LMCO and associated sub-contractors to complete Knowledge Points 7 and 8 and the tailored qualification/flight test program.
FY 2019 Boeing costs includes software integration onto the B-1 and the F/A-18 E/F to maintain synchronization with system and hardware development. Software development tests on F/A-18 E/F and Systems Engineering Technical Review (SETR) 8.0 (USN EOC Readiness Review).

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Government Support | WR | NAWC AD : Patuxent River,MD | 4.446 | 2.324 | Oct 2016 | 2.303 | Oct 2017 | 2.527 | Nov 2018 | - | | 2.527 | 0.000 | 11.600 | - |
| Government Support | WR | NAWC WD : China Lake, CA | 28.241 | 11.306 | Oct 2016 | 10.442 | Oct 2017 | 11.120 | Nov 2018 | - | | 11.120 | 0.000 | 61.109 | - |
| Government Support | WR | NSWC : Various | 3.107 | 0.291 | Nov 2016 | 0.092 | Nov 2017 | 0.063 | Nov 2018 | - | | 0.063 | 0.000 | 3.553 | - |
| Development Support | C/FFP | NSMA : Washington, DC | 11.982 | 5.570 | Dec 2016 | 5.580 | Dec 2017 | 6.762 | Dec 2018 | - | | 6.762 | 0.000 | 29.894 | 28.794 |
| Development Support | MIPR | USAF : Various | 0.546 | 0.425 | Oct 2016 | 0.190 | Oct 2017 | 0.000 | | - | | 0.000 | 0.000 | 1.161 | - |
| Integrated Logistics Support | WR | NAWC AD : Patuxent River, MD | 0.334 | 0.171 | Oct 2016 | 0.176 | Oct 2017 | 0.200 | Nov 2018 | - | | 0.200 | 0.000 | 0.881 | - |
| Contractor Support | C/CPFF | JHU/APL : Laurel, MD | 11.831 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 11.831 | 11.831 |
| Contractor Support | C/FFP | Schafer Corporation : Arlington, VA | 14.163 | 4.208 | Oct 2016 | 3.719 | May 2018 | 5.293 | May 2019 | - | | 5.293 | 0.000 | 27.383 | 25.883 |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604786N / *(U)Offensive Anti-Surface Warfare Weapon Dev* | **Project (Number/Name)**<br>3337 / *Offensive Anti-Surface Warfare (OASuW) Weapon* |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mission Planning Support | C/CPFF | Northrup Grumman : Bethpage, NY | 5.791 | 3.797 | Oct 2016 | 0.400 | Oct 2017 | 1.100 | Oct 2018 | - | | 1.100 | 0.000 | 11.088 | 10.188 |
| Contractor Support | Various | Various : Various | 7.479 | 0.639 | Oct 2016 | 0.717 | Oct 2017 | 0.931 | Oct 2018 | - | | 0.931 | 0.000 | 9.766 | 9.566 |
| Development Support | Various | NRL : Various | 0.691 | 0.885 | Nov 2016 | 0.575 | Nov 2017 | 0.443 | Nov 2018 | - | | 0.443 | 0.000 | 2.594 | 2.494 |
| Development Support | C/FPIF | ONR : Arlington, VA | 0.000 | 0.000 | | 0.000 | | 3.800 | Dec 2018 | - | | 3.800 | 0.000 | 3.800 | 3.800 |
| Prior Yr Supp no longer funded in the FYDP | Various | Various : Various | 2.800 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 2.800 | 2.800 |
| | | **Subtotal** | 91.411 | 29.616 | | 24.194 | | 32.239 | | - | | 32.239 | 0.000 | 177.460 | N/A |

**Remarks**

FY 2019 Support costs consist of support from Government offices and Contractor Support experts associated with threat analysis, CONOPs, and Training and Tactical assessments in support of Knowledge Points 7 and 8, the developmental test program, the Quick Reaction Assessment (QRA), and tactics development supporting USN EOC. Schafer Corporation increased to reflect full funding for Option Year 3 and Option Year 4 in FY 2018 and FY 2019

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Development Support | WR | NAWC WD : China Lake, CA | 18.926 | 15.224 | Oct 2016 | 13.180 | Oct 2017 | 10.236 | Nov 2018 | - | | 10.236 | 0.000 | 57.566 | - |
| Development Support | WR | NAWC AD : Patuxent River, MD | 11.121 | 13.082 | Oct 2016 | 3.071 | Oct 2017 | 2.110 | Nov 2018 | - | | 2.110 | 0.000 | 29.384 | - |
| Development Support | WR | NSWC : Various | 0.131 | 0.210 | Nov 2016 | 0.079 | Nov 2017 | 0.081 | Nov 2018 | - | | 0.081 | 0.000 | 0.501 | - |
| Development Support | WR | COTF : Norfolk, VA | 0.107 | 0.100 | Oct 2016 | 0.000 | | 0.100 | Dec 2018 | - | | 0.100 | 0.000 | 0.307 | - |
| Development Support | MIPR | USAF : Various | 1.372 | 3.930 | Oct 2016 | 1.106 | Oct 2017 | 0.472 | Oct 2018 | - | | 0.472 | 0.000 | 6.880 | - |
| Wind Tunnel Testing | MIPR | AEDC : Arnolds AFB, TN | 4.153 | 0.000 | | 0.000 | | 0.600 | Mar 2019 | - | | 0.600 | 0.000 | 4.753 | - |
| | | **Subtotal** | 35.810 | 32.546 | | 17.436 | | 13.599 | | - | | 13.599 | 0.000 | 99.391 | N/A |

**Remarks**

FY 2019 Test and Evaluation costs support flight testing, system qualifications, range time, and target costs needed for the F/A-18 E/F to support Knowledge Points 7 and 8, the developmental test program, and the Quick Reaction Assessment (QRA).

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604786N / *(U)Offensive Anti-Surface Warfare Weapon Dev* | **Project (Number/Name)**<br>3337 / *Offensive Anti-Surface Warfare (OASuW) Weapon* |

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Government Support | WR | NAWC AD : Patuxent River, MD | 5.659 | 1.275 | Oct 2016 | 1.311 | Oct 2017 | 1.405 | Nov 2018 | - | | 1.405 | 0.000 | 9.650 | - |
| Government Support | WR | NAWC WD : China Lake, CA | 2.619 | 1.260 | Oct 2016 | 1.207 | Oct 2017 | 1.290 | Nov 2018 | - | | 1.290 | 0.000 | 6.376 | - |
| Project Management Support | C/CPFF | NAWC AD : Patuxent River, MD | 1.600 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.600 | 1.600 |
| Travel | Various | NAWC AD : Patuxent River, MD | 0.725 | 0.500 | Oct 2016 | 0.500 | Oct 2017 | 0.400 | Oct 2018 | - | | 0.400 | 0.000 | 2.125 | - |
| | | **Subtotal** | 10.603 | 3.035 | | 3.018 | | 3.095 | | - | | 3.095 | 0.000 | 19.751 | N/A |

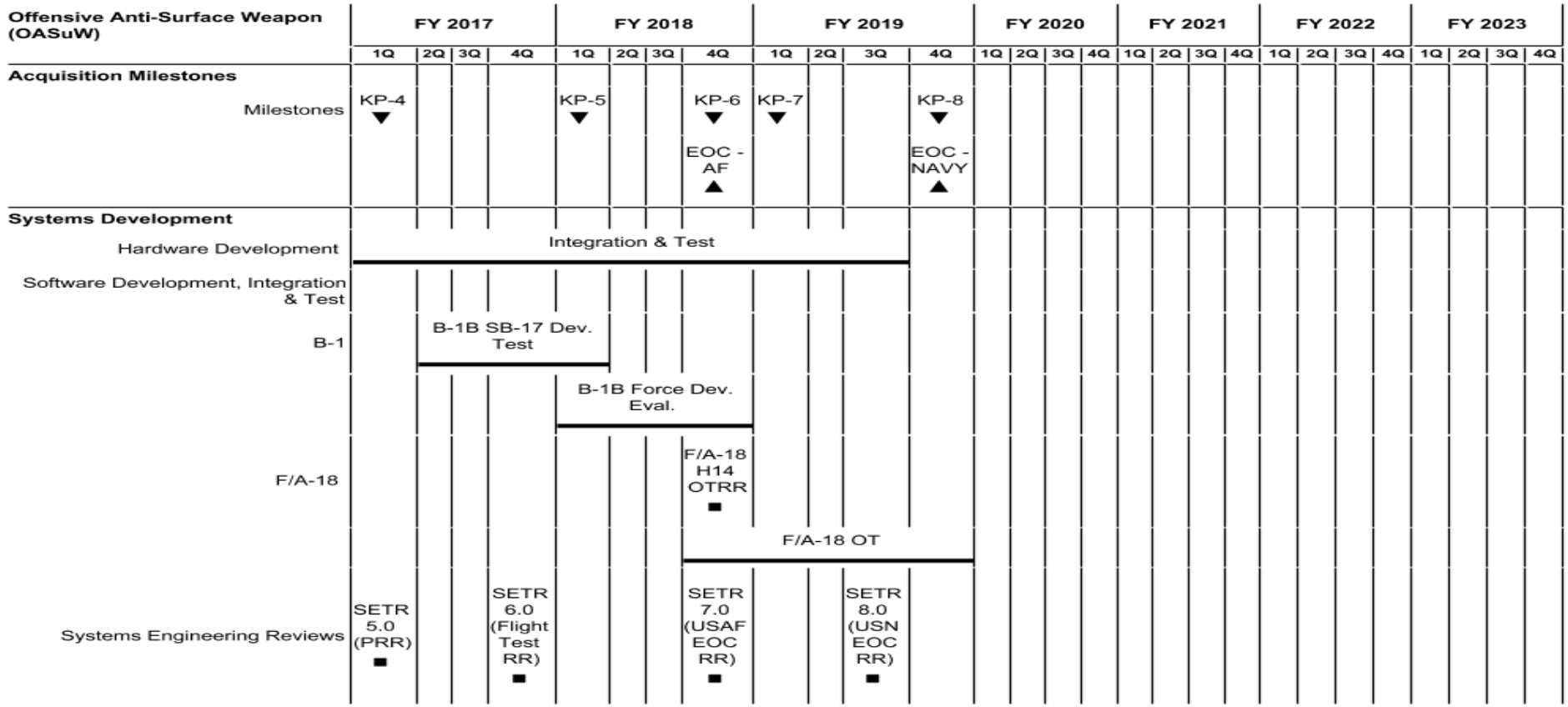
**Remarks**

FY 2019 Management Services costs consist of Non-Headquarters Program Office Management team (Government labor and Contractor support services) required for the management of the program.

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 694.719 | 301.554 | | 160.694 | | 143.062 | | - | | 143.062 | 0.000 | 1,300.029 | N/A |

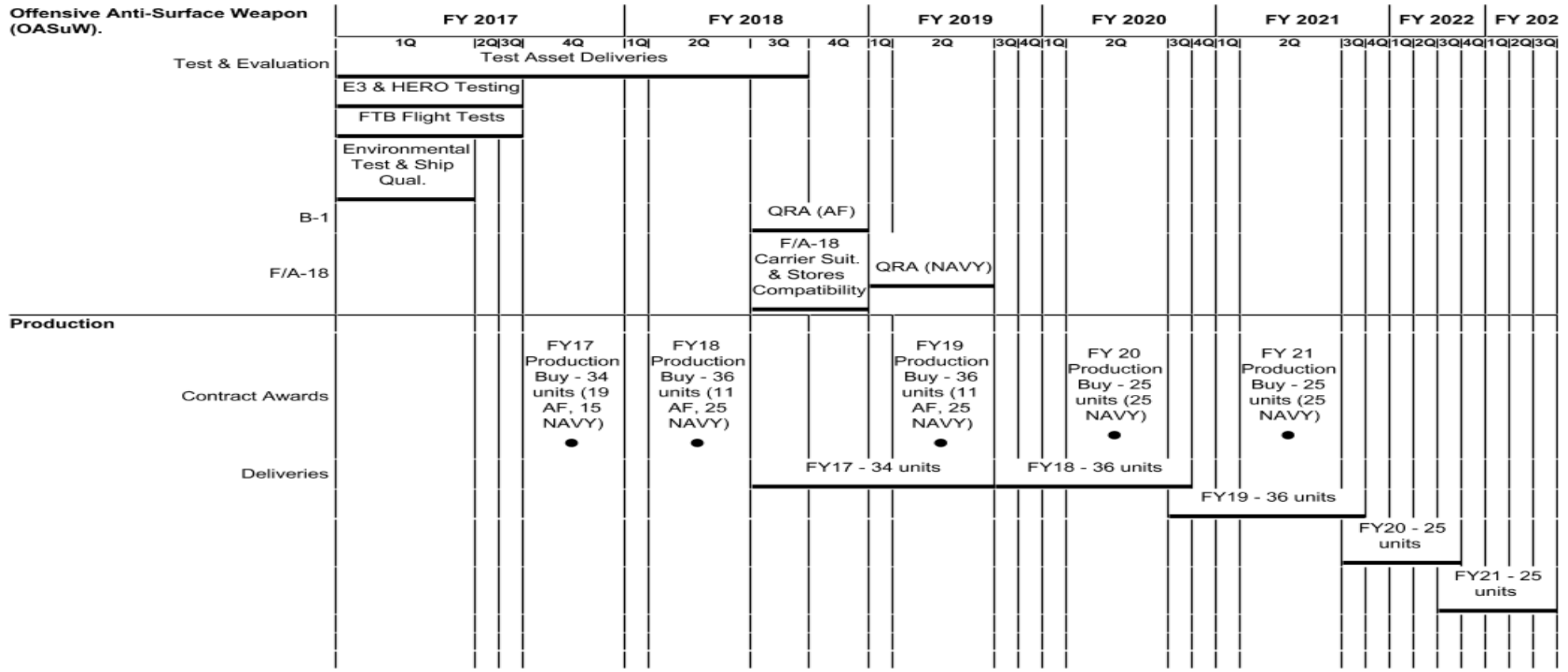
**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604786N / *(U)Offensive Anti-Surface Warfare Weapon Dev* | **Project (Number/Name)**<br>3337 / *Offensive Anti-Surface Warfare (OASuW) Weapon* |




*2019PB - 0604786N - 3337*

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604786N / *(U)Offensive Anti-Surface Warfare Weapon Dev* | **Project (Number/Name)**<br>3337 / *Offensive Anti-Surface Warfare (OASuW) Weapon* |




*2019PB - 0604786N - 3337*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604786N / *(U)Offensive Anti-Surface Warfare Weapon Dev* | **Project (Number/Name)**<br>3337 / *Offensive Anti-Surface Warfare (OASuW) Weapon* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Offensive Anti-Surface Weapon (OASuW)*** | | | | |
| Acquisition Milestones: Milestones: Knowledge Point 4 | 1 | 2017 | 1 | 2017 |
| Acquisition Milestones: Milestones: Knowledge Point 5 | 1 | 2018 | 1 | 2018 |
| Acquisition Milestones: Milestones: Knowledge Point 6 | 4 | 2018 | 4 | 2018 |
| Acquisition Milestones: Milestones: Knowledge Point 7 | 1 | 2019 | 1 | 2019 |
| Acquisition Milestones: Milestones: Knowledge Point 8 | 4 | 2019 | 4 | 2019 |
| Acquisition Milestones: Milestones: Early Operational Capability (EOC) Air Force | 4 | 2018 | 4 | 2018 |
| Acquisition Milestones: Milestones: Early Operational Capability (EOC) Navy | 4 | 2019 | 4 | 2019 |
| Systems Development: Hardware Development: Integration & Test | 1 | 2017 | 3 | 2019 |
| Systems Development: B-1: B-1 SB-17 Software Development Test | 2 | 2017 | 1 | 2018 |
| Systems Development: B-1: B-1 Force Development Evaluation | 1 | 2018 | 4 | 2018 |
| Systems Development: F/A-18: F/A-18 H14 Operational Test Readiness Review | 4 | 2018 | 4 | 2018 |
| Systems Development: F/A-18: F/A-18 H14 Operational Test | 4 | 2018 | 4 | 2019 |
| Systems Development: Systems Engineering Reviews: System Engineering Technical Review 5.0 (Production Readiness Review) | 1 | 2017 | 1 | 2017 |
| Systems Development: Systems Engineering Reviews: System Engineering Technical Review 6.0 (Flight Test Readiness Review) | 4 | 2017 | 4 | 2017 |
| Systems Development: Systems Engineering Reviews: System Engineering Technical Review 7.0 (USAF EOC Readiness Review) | 4 | 2018 | 4 | 2018 |
| Systems Development: Systems Engineering Reviews: System Engineering Technical Review 8.0 (USN EOC Readiness Review) | 3 | 2019 | 3 | 2019 |
| ***Offensive Anti-Surface Weapon (OASuW).*** | | | | |
| Test & Evaluation: Test Asset Deliveries | 1 | 2017 | 3 | 2018 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0604786N / *(U)Offensive Anti-Surface Warfare Weapon Dev* | **Project (Number/Name)**<br>3337 / *Offensive Anti-Surface Warfare (OASuW) Weapon* |

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| Test & Evaluation: E3 & HERO Testing | 1 | 2017 | 3 | 2017 |
| Test & Evaluation: FTB Flight Tests | 1 | 2017 | 3 | 2017 |
| Test & Evaluation: Environmental Test & Ship Qualification | 1 | 2017 | 1 | 2017 |
| B-1: Quick Reaction Assessment Testing (AF) | 3 | 2018 | 4 | 2018 |
| F/A-18: Quick Reaction Assessment Testing (Navy) | 1 | 2019 | 2 | 2019 |
| F/A-18: F/A-18 Carrier Suitability & Stores Compatibility | 3 | 2018 | 4 | 2018 |
| Production: Contract Awards: FY17 Production Buy - 34 units (19 AF, 15 NAVY) | 4 | 2017 | 4 | 2017 |
| Production: Contract Awards: FY18 Production Buy - 36 units (11 AF, 25 NAVY) | 2 | 2018 | 2 | 2018 |
| Production: Contract Awards: FY19 Production Buy - 36 units (11 AF, 25 NAVY) | 2 | 2019 | 2 | 2019 |
| Production: Contract Awards: FY 20 Production Buy - 25 units (25 NAVY) | 2 | 2020 | 2 | 2020 |
| Production: Contract Awards: FY 21 Production Buy - 25 units (25 NAVY) | 2 | 2021 | 2 | 2021 |
| Production: Deliveries: FY17 Deliveries - 34 units | 3 | 2018 | 2 | 2019 |
| Production: Deliveries: FY18 Deliveries - 36 units | 3 | 2019 | 3 | 2020 |
| Production: Deliveries: FY19 Deliveries - 36 units | 3 | 2020 | 3 | 2021 |
| Production: Deliveries: FY 20 Deliveries - 25 units | 3 | 2021 | 3 | 2022 |
| Production: Deliveries: FY 21 Deliveries - 25 units | 3 | 2022 | 3 | 2023 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0605812M *I (U)Joint Light Tactical Vehicle(JLTV) EMD* |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Program Element | 119.690 | 7.658 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 127.348 |
| 3209: *Joint Light Tactical Vehicle* | 119.690 | 7.658 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 127.348 |

**Program MDAP/MAIS Code:**
**Project MDAP/MAIS Code(s):** 279

**Note**

The FY 2011 NDAA directed the Services to separate the Joint Light Tactical Vehicle (JLTV) program into distinct PEs to provide Congress with increased transparency and allow for more effective oversight. Transition of funding from PE 0603635M to PE 0605812M was effective beginning in FY 2013.

Beginning in FY18, the program funding transitions from Program Element 0605812M Joint Light Tactical Vehicle (JLTV) EMD to Program Element 0605813M Joint Light Tactical Vehicle (JLTV) System Development and Demonstration as the program proceeds through the acquisition process.

**A. Mission Description and Budget Item Justification**

Funding supports the development and testing of the JLTV Family of Vehicles (FoV). JLTV is a joint program between the U.S. Army and the U.S. Marine Corps, of which the U.S. Army is the lead service. JLTV is a FoV capable of performing multiple mission roles designed to provide protected, sustained, and networked mobility for personnel and payloads across the full Range of Military Operations (ROMO). JLTV objectives include increased performance, protection, and payload over the current legacy HMMWV fleet, minimizing ownership costs by maximizing commonality, fuel efficiency and reliability. The commonality of components, maintenance procedures, training, etc, among vehicles is expected to be inherent in FoV solutions across mission variants to minimize total ownership cost. Unique service requirements have been minimized.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 23.197 | 0.000 | 0.000 | - | 0.000 |
| Current President's Budget | 7.658 | 0.000 | 0.000 | - | 0.000 |
| Total Adjustments | -15.539 | 0.000 | 0.000 | - | 0.000 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | -1.687 | 0.000 | | | |
| • SBIR/STTR Transfer | -0.253 | 0.000 | | | |
| • Rate/Misc Adjustments | 0.001 | 0.000 | 0.000 | - | 0.000 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | Date: February 2018 |
|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | R-1 Program Element (Number/Name)<br>PE 0605812M *I (U)Joint Light Tactical Vehicle(JLTV) EMD* | | | |
| • Congressional Directed Reductions | -13.600 | - | - | - | - |
| Adjustments | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0605812M / *(U)Joint Light Tactical Vehicle(JLTV) EMD* | Project (Number/Name)<br>3209 / *Joint Light Tactical Vehicle* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3209: *Joint Light Tactical Vehicle* | 119.690 | 7.658 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 127.348 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**Project MDAP/MAIS Code:** 279

**Note**

Beginning in FY18, the program funding transitions from Program Element 0605812M Joint Light Tactical Vehicle (JLTV) EMD to Program Element 0605813M Joint Light Tactical Vehicle (JLTV) System Development and Demonstration as the program proceeds through the acquisition process.

**A. Mission Description and Budget Item Justification**

Funding supports the development and testing of the JLTV Family of Vehicles (FoV). JLTV is a joint program between the U.S. Army and the U.S. Marine Corps, of which the U.S. Army is the lead service. JLTV is a FoV capable of performing multiple mission roles designed to provide protected, sustained, and networked mobility for personnel and payloads across the full Range of Military Operations (ROMO). JLTV objectives include increased performance, protection, and payload over the current legacy HMMWV fleet, minimizing ownership costs by maximizing commonality, fuel efficiency and reliability. The commonality of components, maintenance procedures, training, etc, among vehicles is expected to be inherent in FoV solutions across mission variants to minimize total ownership cost. Unique service requirements have been minimized.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** GFE, ILS, Facilities Documentation/Analysis and Support Engineering | 1.339 | 0.000 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>-Funding for the JLTV program transitions to PE 0605813M beginning FY18.<br>***FY 2019 Base Plans:***<br>N/A<br>***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***Title:*** Test and Evaluation Events and Analysis | 4.601 | 0.000 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0605812M / *(U)Joint Light Tactical Vehicle(JLTV) EMD* | **Project (Number/Name)**<br>3209 / *Joint Light Tactical Vehicle* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| -Funding for the JLTV program transitions to PE 0605813M beginning FY18.<br>***FY 2019 Base Plans:***<br>N/A<br>***FY 2019 OCO Plans:***<br>N/A | | | | | |
| ***Title:*** Program Management Support | 1.718 | 0.000 | 0.000 | 0.000 | 0.000 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>-Funding for the JLTV program transitions to PE 0605813M beginning FY18.<br>***FY 2019 Base Plans:***<br>N/A<br>***FY 2019 OCO Plans:***<br>N/A | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 7.658 | 0.000 | 0.000 | 0.000 | 0.000 |

**C. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • PMC/5095: *0605812M- JLTV* | 104.230 | 233.639 | 607.011 | - | 607.011 | 707.778 | 475.381 | 439.744 | 421.609 | 710.182 | 3,765.577 |
| • OPA/D15603: *JLTV (Army)* | 587.514 | 804.440 | 1,319.436 | - | 1,319.436 | 1,147.246 | 1,242.725 | 1,346.783 | 1,211.192 | 14,970.677 | 23,044.538 |
| • RDTEA/VU9: *0605812A-JLTV (Army)* | 11.086 | 23.467 | 2.686 | - | 2.686 | 2.732 | 1.744 | 2.789 | 4.799 | 74.341 | 584.096 |
| • RDT&E/0605813M: *Joint Light Tactical Vehicle (Sys Dev & Dem)* | 0.000 | 20.710 | 2.260 | - | 2.260 | 2.122 | 0.026 | 0.024 | 0.022 | Continuing | Continuing |

**Remarks**

**D. Acquisition Strategy**

Joint Light Tactical Vehicle (JLTV) is a Joint Service Program with the U.S. Army and U.S. Marine Corps as the two main components. The U.S. Army is the JLTV service lead.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0605812M / *(U)Joint Light Tactical Vehicle(JLTV) EMD* | **Project (Number/Name)**<br>3209 / *Joint Light Tactical Vehicle* |

The JLTV Program entered the Production and Deployment Phase with the Acquisition Decision Memorandum authorization on 25 August 2015. With Milestone C approval, the LRIP fixed price contract was awarded to Oshkosh Defense LLC on 25 August 2015. This contract consists of a three year LRIP period with options for five additional years of FRP deliveries. JPO JLTV requested separately priced firm fixed price (FFP) option(s) for purchase of the Technical Data Package (TDP) with appropriate data rights to allow for possible future competition for production vehicles and spares.

During the LRIP phase, JPO JLTV will continue to produce production vehicles for extensive Test and Evaluation activities to support a FRP decision. A ramp up of JLTV quantities will continue to support fielding to U.S. Army and USMC units once the FRP decision is achieved and allow the program to transition into Full Rate production.

The JLTV program will continually monitor emerging technologies and capabilities through its partnerships with U.S. Army and USMC science and technology organizations as well as through industry market research and partnerships. At this time follow-on increments for technology insertion are undefined; the JLTV program will look for opportunities to implement increased capabilities throughout the system Life Cycle.

**E. Performance Metrics**

Milestone Reviews

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0605812M / *(U)Joint Light Tactical Vehicle(JLTV) EMD* | Project (Number/Name)<br>3209 / *Joint Light Tactical Vehicle* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Prior Years Cumulative Funding | Various | Various : Various | 52.642 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 52.642 | - |
| | | **Subtotal** | 52.642 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 52.642 | N/A |

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Prior Years Cumulative Funding | Various | Various : Various | 8.475 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 8.475 | - |
| System Integration | MIPR | SSC-A : Charleston, SC | 0.000 | 1.339 | Feb 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.339 | - |
| | | **Subtotal** | 8.475 | 1.339 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 9.814 | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Developmental Test & Evaluation (Performance, RAM, Ballistic, Report Generation) | MIPR | Govt Proving Grounds-ARL : Aberdeen, MD | 7.586 | 1.153 | Jan 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 8.739 | - |
| Prior Years Cumulative Funding | Various | Various : Various | 17.978 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 17.978 | - |
| Developmental Test & Evaluation (Performance, RAM, Ballistic, Report Generation) | MIPR | Govt Proving Grounds : Various | 7.508 | 2.073 | Jan 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 9.581 | - |
| Developmental Test & Evaluation (Oversight) | WR | MCOTEA : Quantico, VA | 1.224 | 0.200 | Jan 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.424 | - |
| Live Fire Test & Evaluation | MIPR | ATC : Aberdeen, MD | 7.210 | 0.695 | Sep 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 7.905 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0605812M / *(U)Joint Light Tactical Vehicle(JLTV) EMD* | **Project (Number/Name)**<br>3209 / *Joint Light Tactical Vehicle* |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Developmental Test & Evaluation | C/FFP | CORVID : Moorsville, NC | 1.313 | 0.480 | May 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.793 | - |
| | | **Subtotal** | 42.819 | 4.601 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 47.420 | N/A |

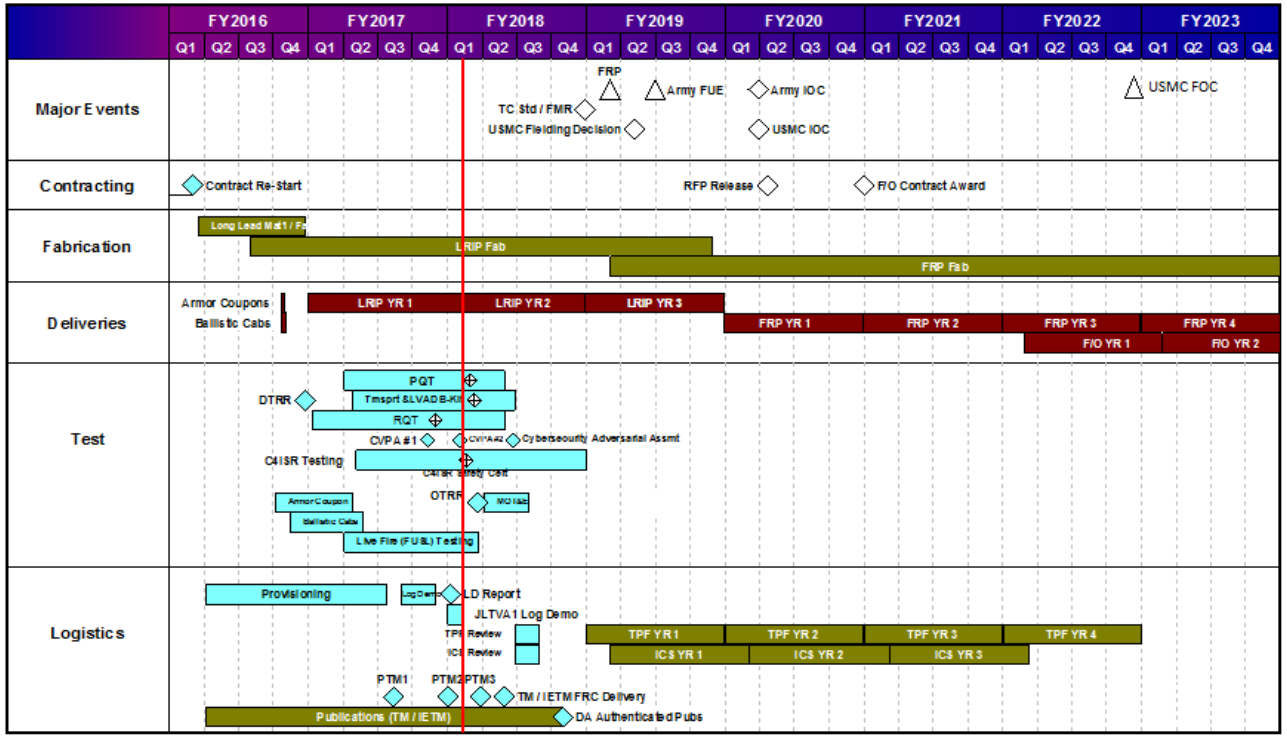
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Prior Years Cumulative Funding | Various | Various : Various | 10.829 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 10.829 | - |
| Program Management Support | C/CPFF | Various : Various | 2.908 | 1.268 | Oct 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 4.176 | - |
| Program Management Support | C/CPFF | CECOM/MITRE : Aberdeen Proving Ground, MD | 1.130 | 0.150 | Sep 2017 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.280 | - |
| Travel | Various | MCSC : Quantico, VA | 0.887 | 0.300 | Oct 2016 | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 1.187 | - |
| | | **Subtotal** | 15.754 | 1.718 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 17.472 | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 119.690 | 7.658 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 127.348 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0605812M / *(U)Joint Light Tactical Vehicle(JLTV) EMD* | **Project (Number/Name)**<br>3209 / *Joint Light Tactical Vehicle* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0605812M / *(U)Joint Light Tactical Vehicle(JLTV) EMD* | **Project (Number/Name)**<br>3209 / *Joint Light Tactical Vehicle* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3209*** | | | | |
| Requirements/Production Qualification Test | 1 | 2017 | 2 | 2018 |
| Full Up Systems Level Test | 1 | 2017 | 1 | 2018 |
| Logistics Demonstration | 3 | 2017 | 1 | 2018 |
| Multi-Service Operation Test & Evaluation | 2 | 2018 | 3 | 2018 |
| Full Rate Production Decision | 1 | 2019 | 1 | 2019 |
| USMC Fielding Decision | 2 | 2019 | 2 | 2019 |
| USMC Initial Operational Capability | 1 | 2020 | 1 | 2020 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0303354N *I ASW Systems Development - MIP* |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Program Element | 36.543 | 9.110 | 8.278 | 8.889 | - | 8.889 | 10.007 | 9.188 | 9.367 | 10.557 | Continuing | Continuing |
| 0490: *Airborne Acoustic Intelligence (AAI)* | 36.543 | 9.110 | 8.278 | 8.889 | - | 8.889 | 10.007 | 9.188 | 9.367 | 10.557 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

The mission of Airborne ASW Intelligence (AAI) (CNO Project K-0416) is to provide advanced Anti-Submarine Warfare (ASW) capabilities through rapid development of new technology and prototype mechanisms for the collection of ASW related intelligence. This includes full spectrum intelligence collections and cataloging of current targets of interest. The program develops and swiftly deploys disruptive innovation to counter emerging threats in order to maintain the United States' current undersea warfare superiority. AAI employs the capability to quickly reconstruct and analyze passive and active measurements of submarine vulnerabilities providing actionable intelligence to fleet commanders. The AAI data collection program provides full spectrum intelligence data essential for the design and development of advanced sensors, weapon systems, environmental models, and tactical decision aids. AAI collection systems are installed and employed on uniquely configured aircraft, specially configured ground support facilities, ships, and other assets as required for the collection, processing, exfiltration, and dissemination of undersea intelligence. AAI includes recording systems, advanced detection and tracking systems, specially designed sensors, advanced processing systems and techniques, and specially derived tactics.

This is a Military Intelligence Program (MIP).

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under ADVANCED COMPONENT DEVELOPMENT AND PROTOTYPES because it includes all efforts necessary to evaluate integrated technologies, representative models or prototype systems in a high fidelity and realistic operating environment.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 9.110 | 8.278 | 8.967 | - | 8.967 |
| Current President's Budget | 9.110 | 8.278 | 8.889 | - | 8.889 |
| Total Adjustments | 0.000 | 0.000 | -0.078 | - | -0.078 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | - | - | | | |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -0.078 | - | -0.078 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0303354N *I ASW Systems Development - MIP* |

**Change Summary Explanation**

Technical: Not Applicable

Schedule: Added Furious Krypton development starting in 1Q 2020.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0303354N / *ASW Systems Development - MIP* | Project (Number/Name)<br>0490 / *Airborne Acoustic Intelligence (AAI)* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0490: *Airborne Acoustic Intelligence (AAI)* | 36.543 | 9.110 | 8.278 | 8.889 | - | 8.889 | 10.007 | 9.188 | 9.367 | 10.557 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The mission of Airborne ASW Intelligence (AAI)(CNO Project K-0416) is to provide advanced Anti-Submarine Warfare (ASW) capabilities through rapid development of new technology and prototype mechanisms for the collection of ASW related intelligence. This includes full spectrum intelligence collections and cataloging of current targets of interest. The program develops and swiftly deploys disruptive innovation to counter emerging threats in order to maintain the United States' current undersea warfare superiority. AAI employs the capability to quickly reconstruct and analyze passive and active measurements of submarine vulnerabilities providing actionable intelligence to fleet commanders. The AAI data collection program provides full spectrum intelligence data essential for the design and development of advanced sensors, weapon systems, environmental models, and tactical decision aids. AAI collection systems are installed and employed on uniquely configured aircraft, specially configured ground support facilities, ships, and other assets as required for the collection, processing, exfiltration, and dissemination of undersea intelligence. AAI includes recording systems, advanced detection and tracking systems, specially designed sensors, advanced processing systems and techniques, and specially derived tactics.

This is a Military Intelligence Program (MIP).

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** Systems Engineering / Aircraft Mods Active Acoustic Program | 1.670 | 1.551 | 1.399 | 0.000 | 1.399 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Engineering support of Acoustic Intelligence (ACINT) Collection Suites for certified AAI collection platforms and management of full spectrum database. Engineering support for design upgrades to ACINT Collection Suites for certified AAI collection platforms. Evaluate additional P-8 aircraft sensor station for in-flight analysis of ACINT. Continue evaluation of Fleet software releases for Office of Naval Intelligence(ONI) certification aboard ASW collection platforms. Continued upgrades and development for unique airborne avionics and sensors. Continue fielding ACS kits in support of P-8A deployments. | | | | | |
| ***FY 2019 Base Plans:***<br>Engineering support of Acoustic Intelligence (ACINT) Collection Suites for certified AAI collection platforms and management of full spectrum database. Engineering support for design upgrades to ACINT Collection Suites for certified AAI collection platforms. Evaluate additional P-8 aircraft sensor station for in-flight analysis of ACINT. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0303354N / *ASW Systems Development - MIP* | **Project (Number/Name)**<br>0490 / *Airborne Acoustic Intelligence (AAI)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Continue evaluation of Fleet software releases for Office of Naval Intelligence(ONI) certification aboard ASW collection platforms. Continued upgrades and development for unique airborne avionics and sensors. Continue fielding ACS kits in support of P-8A deployments.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Decrease due to Navy-wide efficiencies and rate adjustments. | | | | | |
| ***Title:*** Data Collection and Analysis | 1.085 | 1.035 | 1.044 | 0.000 | 1.044 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Data collection support at Operational Wings. Ongoing collection of high interest acoustic and non-acoustic data in support of MASINT/ONI threat assessment requirements. Characterization, analysis and certification of the upgraded Fleet MASINT collection assets. Reduction, Analysis and Fleet Rapid Feedback. Conduct special operations support. Essential performance modeling and evaluation for advanced technology sensor systems design and Fleet tactics development. Develop post mission analysis hardware, software and processes in response to evolving enemy capabilities.<br>***FY 2019 Base Plans:***<br>Data collection support at Operational Wings. Ongoing collection of high interest acoustic and non-acoustic data in support of MASINT/ONI threat assessment requirements. Characterization, analysis and certification of the upgraded Fleet MASINT collection assets. Reduction, Analysis and Fleet Rapid Feedback. Conduct special operations support. Essential performance modeling and evaluation for advanced technology sensor systems design and Fleet tactics development. Develop post mission analysis hardware, software and processes in response to evolving enemy capabilities.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Fully funds data collection and analysis activities. | | | | | |
| ***Title:*** Active Measurement Validation | 0.150 | 0.138 | 0.143 | 0.000 | 0.143 |
| ***Articles:*** | - | - | - | - | - |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0303354N / *ASW Systems Development - MIP* | **Project (Number/Name)**<br>0490 / *Airborne Acoustic Intelligence (AAI)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***FY 2018 Plans:***<br>Active Measurement Validation of targets of interest. Provides the acoustic analysis of echo characterization (which includes: signal excess measurements, peak frequency, trend analysis and pulse duration measurements) and target strength.<br>***FY 2019 Base Plans:***<br>Active Measurement Validation of targets of interest. Provides the acoustic analysis of echo characterization (which includes: signal excess measurements, peak frequency, trend analysis and pulse duration measurements) and target strength.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>0.005 increase is due to refined cost estimate. | | | | | |
| ***Title:*** Navy Underwater Active Multiple Ping (NUAMP) Product Development | 6.205 | 5.554 | 5.103 | 0.000 | 5.103 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Continue sonic frequency design, development, integration and test for additional sonic frequencies of the NUAMP sonobuoy family.<br>***FY 2019 Base Plans:***<br>Continue sonic frequency design, development, integration and test for remaining sonic frequencies of the NUAMP sonobuoy family.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Decrease due to Navy-wide efficiencies and rate adjustments. | | | | | |
| ***Title:*** Passive Extended Range Sonobuoy System (PERSS) Product Development | 0.000 | 0.000 | 1.200 | 0.000 | 1.200 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0303354N / *ASW Systems Development - MIP* | **Project (Number/Name)**<br>0490 / *Airborne Acoustic Intelligence (AAI)* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| N/A<br>***FY 2019 Base Plans:***<br>Continue development of disruptive innovative sensors by experimenting and prototyping in a high fidelity and realistic operating environment. Transition various laboratory sonobuoy subsystems by proving the subsystems maturity in real world environments. Perform risk reduction technology demonstration efforts using high gain beamforming sonobuoy transducer assemblies.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Funds Passive Extended Range Sonobuoy System (PERSS) Product Development. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 9.110 | 8.278 | 8.889 | 0.000 | 8.889 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Airborne ASW Intelligence (AAI) is a CNO Special Project. The included technology developments are primarily in-house with contractor participation through existing vehicles.

**E. Performance Metrics**

Provide engineering to support Sound Pressure Level (SPL) recording. Provide data collection support at Operation Wings. Perform Active Measurement Validation of targets of interest.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0303354N / *ASW Systems Development - MIP* | Project (Number/Name)<br>0490 / *Airborne Acoustic Intelligence (AAI)* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Active Measurement Validation | WR | NAWCAD : PATUXENT RIVER, MD | 1.743 | 0.150 | Dec 2016 | 0.138 | Dec 2017 | 0.143 | Dec 2018 | - | | 0.143 | Continuing | Continuing | Continuing |
| Ancillary Hdw Development | WR | NAWCAD : PATUXENT RIVER, MD | 5.139 | 0.875 | Dec 2016 | 0.500 | Dec 2017 | 0.500 | Dec 2018 | - | | 0.500 | Continuing | Continuing | Continuing |
| Ancillary Hdw Development Cont | Various | VARIOUS : VARIOUS | 0.947 | 0.599 | Dec 2016 | 0.585 | Dec 2017 | 0.593 | Dec 2018 | - | | 0.593 | Continuing | Continuing | Continuing |
| Systems Eng | WR | NAWCAD : PATUXENT RIVER, MD | 4.891 | 0.927 | Dec 2016 | 0.665 | Dec 2017 | 0.676 | Dec 2018 | - | | 0.676 | Continuing | Continuing | Continuing |
| Systems Eng | Various | VARIOUS : VARIOUS | 1.522 | 0.743 | Dec 2016 | 0.793 | Dec 2017 | 0.723 | Dec 2018 | - | | 0.723 | Continuing | Continuing | Continuing |
| Primary Hdw Development | SS/CPIF | ERAPSCO : FT. WAYNE IN | 18.525 | 5.268 | Dec 2016 | 5.347 | Dec 2017 | 6.004 | Dec 2018 | - | | 6.004 | 14.080 | 49.224 | 49.224 |
| | | **Subtotal** | 32.767 | 8.562 | | 8.028 | | 8.639 | | - | | 8.639 | Continuing | Continuing | N/A |

**Management Services ($ in Millions)**

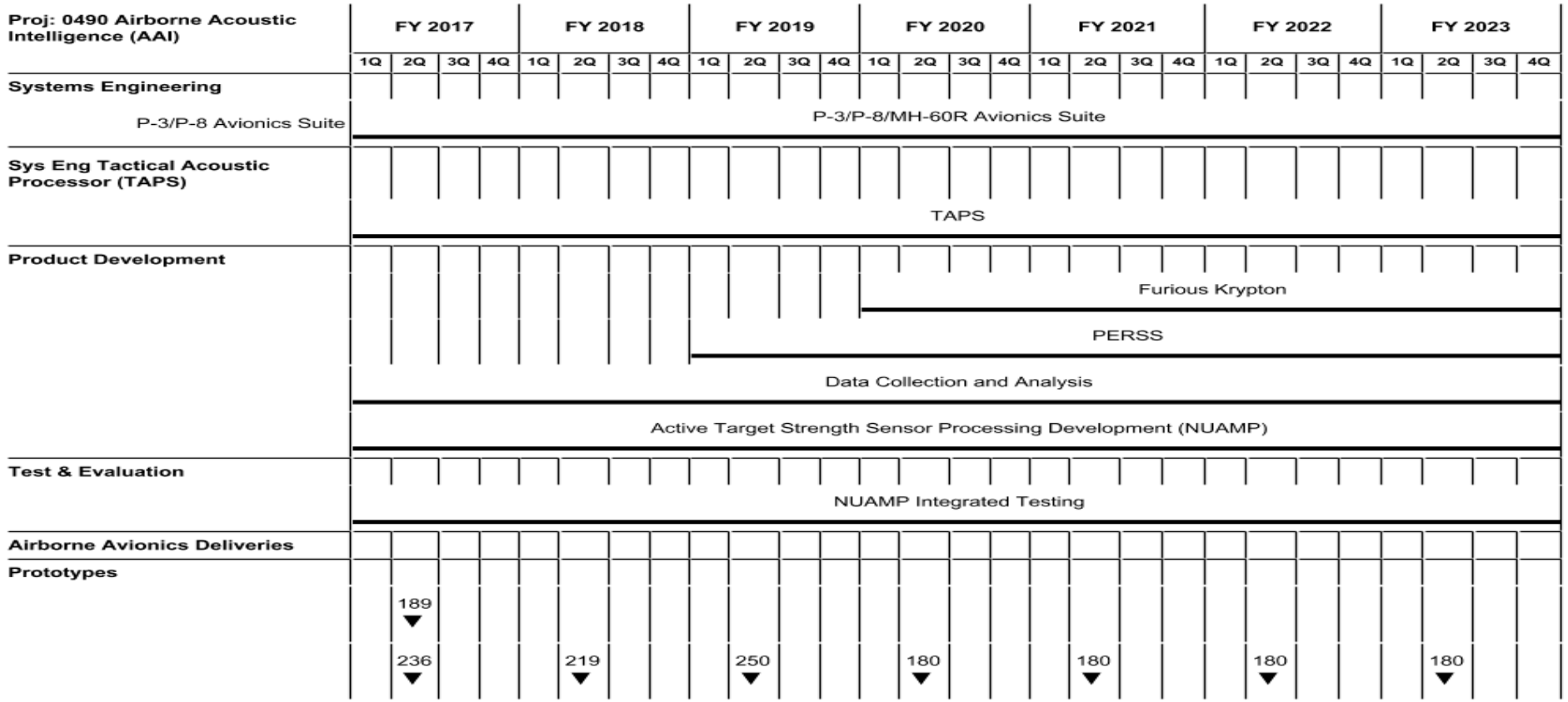
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mgt & Prof Spt Svcs (Non-FFRDC) | Various | VARIOUS : VARIOUS | 3.154 | 0.319 | Dec 2016 | 0.202 | Dec 2017 | 0.205 | Dec 2018 | - | | 0.205 | Continuing | Continuing | Continuing |
| Contractor Eng Spt | Various | VARIOUS : VARIOUS | 0.407 | 0.181 | Dec 2016 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| Travel | Various | VARIOUS : VARIOUS | 0.184 | 0.048 | Dec 2016 | 0.048 | Dec 2017 | 0.045 | Dec 2018 | - | | 0.045 | Continuing | Continuing | Continuing |
| Prior year Mgmt Svcs no longer funded in the FYDP | Various | VARIOUS : VARIOUS | 0.031 | 0.000 | | 0.000 | | 0.000 | | - | | 0.000 | 0.000 | 0.031 | - |
| | | **Subtotal** | 3.776 | 0.548 | | 0.250 | | 0.250 | | - | | 0.250 | Continuing | Continuing | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0303354N / *ASW Systems Development - MIP* | Project (Number/Name)<br>0490 / *Airborne Acoustic Intelligence (AAI)* | |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 36.543 | 9.110 | | 8.278 | | 8.889 | | - | | 8.889 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0303354N / *ASW Systems Development - MIP* | **Project (Number/Name)**<br>0490 / *Airborne Acoustic Intelligence (AAI)* |




*2019PB - 0303354N - 0490*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0303354N / *ASW Systems Development - MIP* | **Project (Number/Name)**<br>0490 / *Airborne Acoustic Intelligence (AAI)* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj: 0490 Airborne Acoustic Intelligence (AAI)*** | | | | |
| Systems Engineering: P-3/P-8 Avionics Suite: P-3/P-8/MH-60R Avionics Suite | 1 | 2017 | 4 | 2023 |
| Sys Eng Tactical Acoustic Processor (TAPS): Sys Eng Tactical Acoustic Processor (TAPS) | 1 | 2017 | 4 | 2023 |
| Product Development: Furious Krypton Development | 1 | 2020 | 4 | 2023 |
| Product Development: Passive Extended Range Sonic Sensor | 1 | 2019 | 4 | 2023 |
| Product Development: Data Collection and Analysis | 1 | 2017 | 4 | 2023 |
| Product Development: Active Target Strength sensor processing development | 1 | 2017 | 4 | 2023 |
| Test & Evaluation: Technical Evaluation | 1 | 2017 | 4 | 2023 |
| Prototypes: Prototype 3 | 2 | 2017 | 2 | 2017 |
| Prototypes: Prototype 4 | 2 | 2017 | 2 | 2017 |
| Prototypes: Prototype 5 | 2 | 2018 | 2 | 2018 |
| Prototypes: Prototype 6 | 2 | 2019 | 2 | 2019 |
| Prototypes: Prototype 7 | 2 | 2020 | 2 | 2020 |
| Prototypes: Prototype 8 | 2 | 2021 | 2 | 2021 |
| Prototypes: Prototype 9 | 2 | 2022 | 2 | 2022 |
| Prototypes: Prototype 10 | 2 | 2023 | 2 | 2023 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0304240M *I (U)Advanced Tactical Unmanned Aircraft System* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 0.000 | 0.000 | 7.979 | 25.291 | - | 25.291 | 26.770 | 26.066 | 24.125 | 61.741 | Continuing | Continuing |
| 3135: *USMC MUX Medium Altitude - Long Endurance (MALE) Group 5 UAV* | 0.000 | 0.000 | 4.978 | 20.438 | - | 20.438 | 26.768 | 26.066 | 24.125 | 61.741 | Continuing | Continuing |
| 3427: *KMAX Experimentation and Support* | 0.000 | 0.000 | 3.001 | 4.853 | - | 4.853 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 7.856 |

**A. Mission Description and Budget Item Justification**

This program element provides for development and capability requirements for Advanced Tactical Unmanned Aerial Vehicles in support of expeditionary efforts Projects are Joint Military Intelligence Programs.

Project 3135 - This project provides for the early trade studies, analysis, experimentation, and concept refinement for the Marine Air Ground Task Force (MAGTF) Unmanned Aircraft System (UAS) Expeditionary (MUX) with Vertical/Short Take-Off and Vertical Landing (V/STOVL) capability. These MUX efforts will include maturing key technologies and rapid prototyping to inform a future MUX program of record. Objective capabilities will include strike and cargo resupply. Provides USMC with MUX operational capability in FY26.

Project 3427 - This project provides for experimentation and support of the CQ-24A Cargo UAS (commonly referred to as KMAX). CQ-24A will be used to specifically inform the unmanned cargo resupply requirements of future programs of record, to include MUX. Experimentation includes payloads/sensor integration, control station integration, Concept of Operations (CONOPS) and Tactics, Techniques, and Procedures (TTP) development. These experimentation efforts inform program capability documents and support other military exercises, and advance technologies needed for the future MUX POR.

Cost estimate for Cost to Complete and Total Cost for both project units are being developed and will be promulgated in a future budget request.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0304240M *I (U)Advanced Tactical Unmanned Aircraft System* |

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 0.000 | 7.979 | 10.385 | - | 10.385 |
| Current President's Budget | 0.000 | 7.979 | 25.291 | - | 25.291 |
| Total Adjustments | 0.000 | 0.000 | 14.906 | - | 14.906 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | - | - | | | |
| • Rate/Misc Adjustments | 0.000 | 0.000 | 14.906 | - | 14.906 |

**Change Summary Explanation**

Schedule:
Project 3135 - Updated to reflect MUX experimentation requirements.
Project 3427 - Not applicable

Technical: Not applicable

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0304240M / *(U)Advanced Tactical Unmanned Aircraft System* | Project (Number/Name)<br>3135 / *USMC MUX Medium Altitude - Long Endurance (MALE) Group 5 UAV* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3135: *USMC MUX Medium Altitude - Long Endurance (MALE) Group 5 UAV* | 0.000 | 0.000 | 4.978 | 20.438 | - | 20.438 | 26.768 | 26.066 | 24.125 | 61.741 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Funding provides for the early trade studies, analysis, experimentation, key technology maturation, rapid prototyping, and concept refinement for the Marine Air Ground Task Force (MAGTF) Unmanned Aircraft System (UAS) Expeditionary (MUX) with Vertical/Short Take-Off and Vertical Landing (V/STOVL) capability. The MUX UAV supports Expeditionary Force 21 Operating Concepts and the 2017 Marine Aviation Plan (AvPlan) requires an advanced, multi-mission ship-based Group 5 UAS in support of Marine Expeditionary Force/Marine Expeditionary Brigade-sized MAGTF to address future capability gaps. The future MUX UAV system will provide a weaponized, payload flexible, shipboard capable/expeditionary system that is runway independent for all weather, long range/persistence, operations from the sea in a contested environment. This next generation UAV capability will have far greater range, endurance, altitude, and payload capability than the current conventional VTOL technology can provide from air capable ships. The MUX system Initial Capabilities Document (ICD) was approved in Oct 2016. The Material Development Decision and Analysis of Alternatives (AOA) is planned to start in FY18. Rapid prototyping strategies are also being pursued by the USMC to meet an early operational need date.

This effort will continue to inform program scope, phasing, and cost for development of the MUX capability. Funding in FY19 will also be used to reduce overall MUX program cost by leveraging other technology demonstrator developmental programs; such as the US Army Aviation and Missile Research, Development, and Engineering Center (AMRDEC) Joint Multi-Role Technology Demonstrator (JMR-TD) and Defense Advanced Research Project Agency (DARPA) TERN which both end in FY18, allowing for continued technical maturation effort, rapid prototyping, and smooth transition to a MUX POR.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** MUX Studies, Analysis, Experimentation and Concept Refinement | 0.000 | 3.650 | 18.274 | 0.000 | 18.274 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Provides funding for Government and industry teams for pre-Milestone A activities including industry inquiries, aircraft trade studies, concept refinement, requirements/payload analysis for meeting mission requirements to inform the MUX POR. Supports development of the MUX Concept of Operations and draft Capability Development Document (CDD). Provides funding for experimentation with advanced concept demonstrator UAVs such as USMC CQ-24A Cargo UAS and DARPA/ONR developed Tern Medium Altitude Long Endurance (MALE) UAS, along with other tactical UAV/payload/control station demonstrator efforts to help inform performance requirements, initial Key Performance Parameters (KPP), CONOPS, concepts, tactics, doctrine, | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0304240M / *(U)Advanced Tactical Unmanned Aircraft System* | **Project (Number/Name)**<br>3135 / *USMC MUX Medium Altitude - Long Endurance (MALE) Group 5 UAV* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| and the future MUX program of record. Provides funding for engineering architecture assessments (aircraft and payloads) to establish specific areas the government will function as the systems integrator. This will inform a future POR in order to reduce life cycle costs.<br>***FY 2019 Base Plans:***<br>Provides funding for Government and industry teams for acquisition activities including industry inquiries, aircraft trade studies, concept refinement, requirements/payload analysis, and rapid prototyping efforts related to the MUX POR. Supports continued development of the MUX Concept of Operations and draft CDD. Provides funding for experimentation with advanced concept demonstrator UAVs such as USMC CQ-24A Cargo UAS, DARPA/ONR developed Tern UAS, and US Army AMRDEC JMR-TD aircraft projects, along with other tactical UAV/payload/control station demonstrator efforts, to help inform tactical unmanned system performance requirements, initial KPP, CONOPS, concepts, tactics, doctrine, the future MUX program of record, and support rapid prototyping efforts. Provides funding for engineering architecture assessments (aircraft and payloads) to establish specific areas where the government will function as the systems integrator.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Increase from $3.650M to $18.274M results from additional industry capability RFIs and trade studies to support a future program of record. | | | | | |
| ***Title:*** Technical and Engineering Services | 0.000 | 1.328 | 2.164 | 0.000 | 2.164 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Initiate and provide Government Engineering support, Contractor support, Program support and travel for execution of<br>MUX studies, experimentation, and concept refinement and for pre-MS A related acquisition activities to support the<br>future MUX program of record.<br>***FY 2019 Base Plans:***<br>Provide Government Engineering support, Contractor support, Program support and travel for execution of | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0304240M / *(U)Advanced Tactical Unmanned Aircraft System* | **Project (Number/Name)**<br>3135 / *USMC MUX Medium Altitude - Long Endurance (MALE) Group 5 UAV* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| MUX studies, experimentation, rapid prototyping, and concept refinement and for pre-MS A related acquisition activities to support the future MUX program of record.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Increase of $1.328M to $2.164M results from increased support for government engineering and industry developmental oversight. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 4.978 | 20.438 | 0.000 | 20.438 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

A Material Development Decision is anticipated in FY18. The MUX program will leverage technology of unmanned tactical aviation programs, including DARPA/ONR concept demonstrator UAV S&T programs, US Army AMRDEC JMR-TD aircraft projects, OEM internally funded UAV prototypes when available, existing tactical unmanned technologies, and promising new industry design concepts that result from industry trade studies. The government will develop and award study contracts as required to support program activities and analysis efforts. Assessment of available technology from existing S&T efforts and review of industry inquiries / study contracts will be used to determine the optimum MUX strategy to meet the Initial Operational Capability needs, as well as, a potentially Early Operational Capability which may be met through available rapid prototyping processes. The MUX POR intends to have the Government functioning as the system integrator for the development and sustainment of the program to reduce life cycle costs.

**E. Performance Metrics**

Performance metrics include successful completion of Trade Studies; successful development of a CONOPS and draft CDD, identification of material solutions for concept refinement, and analysis of architectures.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0304240M / *(U)Advanced Tactical Unmanned Aircraft System* | **Project (Number/Name)**<br>3135 / *USMC MUX Medium Altitude - Long Endurance (MALE) Group 5 UAV* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MUX Studies and Experimentation | Various | TBD : TBD | 0.000 | 0.000 | | 1.500 | Jan 2018 | 15.599 | Nov 2018 | - | | 15.599 | Continuing | Continuing | Continuing |
| Requirements Analysis and Engineering Assessments | WR | Various : Various | 0.000 | 0.000 | | 2.150 | Jan 2018 | 2.675 | Nov 2018 | - | | 2.675 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 0.000 | | 3.650 | | 18.274 | | - | | 18.274 | Continuing | Continuing | N/A |

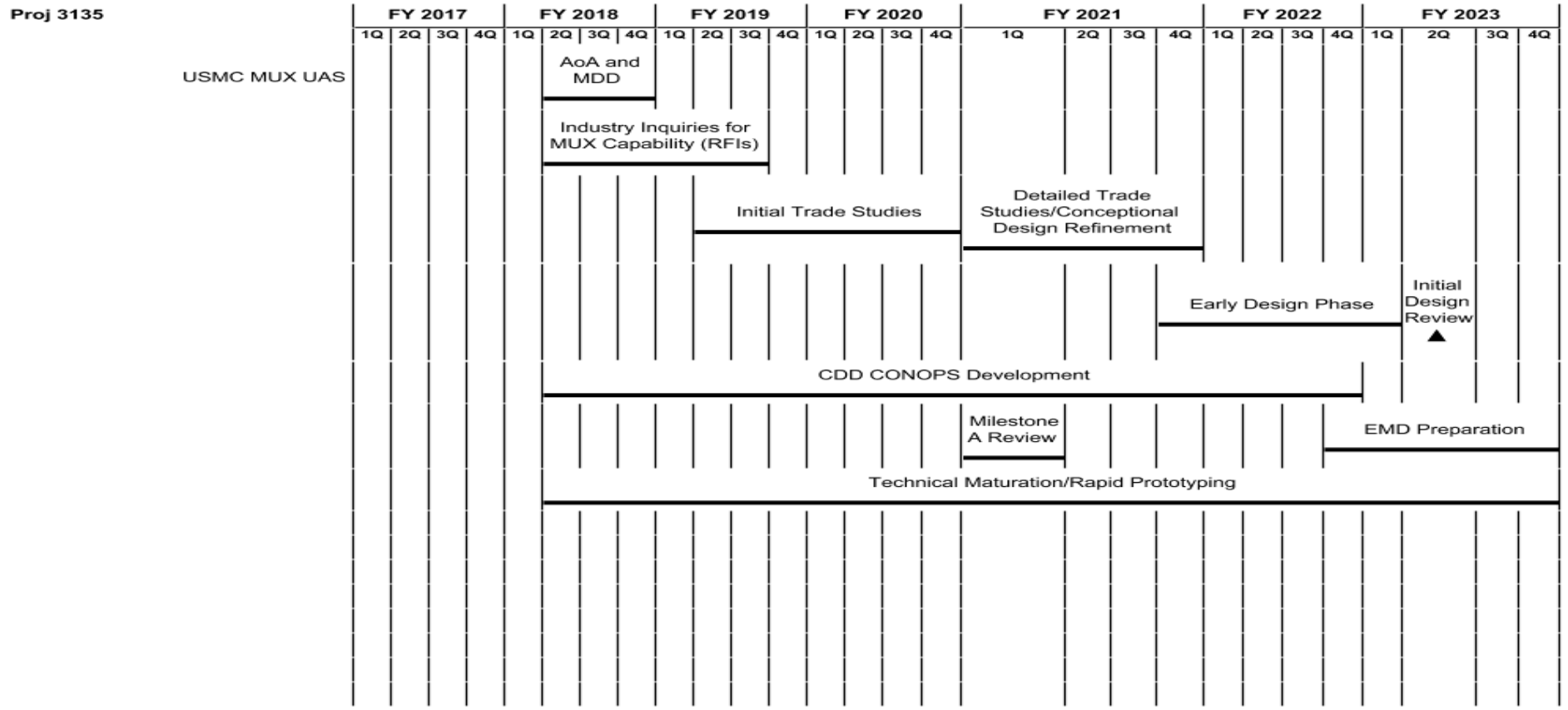
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Government Engineering Support | WR | NAWCAD : Patuxent River, MD | 0.000 | 0.000 | | 0.635 | Jan 2018 | 1.034 | Nov 2018 | - | | 1.034 | 0.000 | 1.669 | - |
| Program Management Support | Various | Various : Various | 0.000 | 0.000 | | 0.600 | Jan 2018 | 1.050 | Nov 2018 | - | | 1.050 | 0.000 | 1.650 | - |
| Travel | WR | NAWCAD : Patuxent River, MD | 0.000 | 0.000 | | 0.093 | Jan 2018 | 0.080 | Nov 2018 | - | | 0.080 | 0.000 | 0.173 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 1.328 | | 2.164 | | - | | 2.164 | 0.000 | 3.492 | N/A |

| | Prior Years | FY 2017 | | FY 2018 | | FY 2019 Base | | FY 2019 OCO | | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 4.978 | | 20.438 | | - | | 20.438 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0304240M / *(U)Advanced Tactical Unmanned Aircraft System* | **Project (Number/Name)**<br>3135 / *USMC MUX Medium Altitude - Long Endurance (MALE) Group 5 UAV* |




*2019PB - 0304240M - 3135*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0304240M / *(U)Advanced Tactical Unmanned Aircraft System* | **Project (Number/Name)**<br>3135 / *USMC MUX Medium Altitude - Long Endurance (MALE) Group 5 UAV* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3135*** | | | | |
| USMC MUX UAS: Analysis of Alternatives and Material Development Decision (AoA & MDD) | 2 | 2018 | 4 | 2018 |
| USMC MUX UAS: Acquisition Milestone: Industry Inquiries for MUX Capability (RFIs) | 2 | 2018 | 3 | 2019 |
| USMC MUX UAS: Acquisition Milestone: Initial Trade Studies | 2 | 2019 | 4 | 2020 |
| USMC MUX UAS: Acquisition Milestone: Detailed Trade Studies/Conceptional Design Refinement | 1 | 2021 | 4 | 2021 |
| USMC MUX UAS: Acquisition Milestone: Early Design Phase | 4 | 2021 | 1 | 2023 |
| USMC MUX UAS: Acquisition Milestone: Initial Design Review | 2 | 2023 | 2 | 2023 |
| USMC MUX UAS: Acquisition Milestone: CDD CONOPS Development | 2 | 2018 | 4 | 2022 |
| USMC MUX UAS: Acqusition Milestone: Engineering Manufacturing & Developoment | 4 | 2022 | 4 | 2023 |
| USMC MUX UAS: Acquisition Milestone: Milestone A Review | 1 | 2021 | 1 | 2021 |
| USMC MUX UAS: Acquisition Milestone: Technical Maturation,UAV Experimentation, Rapid Prototyping | 2 | 2018 | 4 | 2023 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0304240M / *(U)Advanced Tactical Unmanned Aircraft System* | Project (Number/Name)<br>3427 / *KMAX Experimentation and Support* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3427: *KMAX Experimentation and Support* | 0.000 | 0.000 | 3.001 | 4.853 | - | 4.853 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 7.856 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

Funding provides for experimentation for unmanned cargo operations and includes complementary Intelligence, Surveillance, and Reconnaissance (ISR), payloads, advanced sensors, autonomy; efforts to refine requirements and concept of operations (CONOPS); and support of future unmanned programs of record, such as Marine Air Ground Task Force (MAGTF) Unmanned Aircraft System (UAS) Expeditionary (MUX).

The CQ-24A Cargo UAS is a unique, unmanned, sling-load capable aircraft that has had demand signals including moving cargo in permissive environments (e.g. food, fuel, medicine), combatting forest fires in the United States (specifically at night) when manned aircraft don't fly due to safety restrictions, and flying to locations that present dangerous or deadly conditions to humans (such as biological threats or radiation hazards).

The program's 2 Marine Corps CQ-24A were successfully utilized in Afghanistan to support urgent operational needs in that theater of operations. The 2 CQ-24A aircraft and ground control system require contractor services to operate. Utilization of existing CQ-24A systems is an efficient risk reduction method.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** CQ-24A Cargo UAS Experimentation and Support Services | 0.000 | 2.091 | 3.849 | 0.000 | 3.849 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>Provides funding for government and industry teams to operate aircraft in support of tactics development and fleet experimentation and modify aircraft with payloads to support requirements refinement, to include future MUX requirements. Payloads may include sensors, weapons, and systems to support extended range operations. Provides funding for engineering architecture assessments (aircraft and payloads) to establish areas where the government will function as the systems integrator for a program of record, in order to reduce life cycle costs. | | | | | |
| ***FY 2019 Base Plans:***<br>Provides funding for government and industry teams to operate aircraft in support of tactics development and fleet experimentation and modify aircraft with payloads to support requirements refinement, to include future MUX requirements. Payloads may include sensors, weapons, autonomy, and systems to support unique cargo | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0304240M / *(U)Advanced Tactical Unmanned Aircraft System* | **Project (Number/Name)**<br>3427 / *KMAX Experimentation and Support* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| requirements envisioned for MUX or other specialty mission areas that this unique CQ-24A DOD high-value asset can provide.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Increase from $2.091M to $3.849M results from additional tactics development and experimentation flight hours for the program. | | | | | |
| ***Title:*** Technical and Engineering Services<br>***Articles:***<br>***FY 2018 Plans:***<br>Initiate and provide government engineering support, contractor support, program support and travel for execution of CQ-24A Cargo UAS experimentation and concept refinement for study products and acquisition activities to support future programs of record, to include MUX.<br>***FY 2019 Base Plans:***<br>Provide government engineering support, contractor support, program support and travel for execution of CQ-24A Cargo UAS experimentation and concept refinement for study products and acquisition activities to support future programs of record, to include MUX.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Increase from $0.910M to $1.004M results from engineering and technical requirements to support experimentation and developmental oversight. | 0.000<br>- | 0.910<br>- | 1.004<br>- | 0.000<br>- | 1.004<br>- |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 3.001 | 4.853 | 0.000 | 4.853 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0304240M / *(U)Advanced Tactical Unmanned Aircraft System* | **Project (Number/Name)**<br>3427 / *KMAX Experimentation and Support* |

**D. Acquisition Strategy**

The CQ-24A Cargo UAS experimentation and support activities will be contracted through a sole source contract with the aircraft prime vendor in order to support continued experimentation through FY19. It is envisioned that support will continue beyond FY19/20 to align with the MUX program of record concept refinement phase. Other U.S. Government agencies have expressed interest in using these CQ-24A Cargo UAS assets to fight forest fires (at night) in the Midwest. CQ-24A can be made available for experimentation of autonomous fire-fighting through other agency funding (if available).

**E. Performance Metrics**

Performance metrics include successful completion of technical demonstration with published reports and CONOPS updates, along with inputs to unmanned cargo re-supply requirements for capability documents and performance specifications.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0304240M / *(U)Advanced Tactical Unmanned Aircraft System* | **Project (Number/Name)**<br>3427 / *KMAX Experimentation and Support* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CQ-24A Cargo UAS Experimentation | C/CPFF | Lockheed Martin : MCAS Yuma, AZ | 0.000 | 0.000 | | 1.511 | Jan 2018 | 3.239 | Mar 2019 | - | | 3.239 | 0.000 | 4.750 | 4.750 |
| Requirements and Analysis, and Engineering Assessments | WR | NAWCAD : Patuxent River, MD | 0.000 | 0.000 | | 0.580 | Jan 2018 | 0.610 | Mar 2019 | - | | 0.610 | 0.000 | 1.190 | 1.190 |
| | | **Subtotal** | 0.000 | 0.000 | | 2.091 | | 3.849 | | - | | 3.849 | 0.000 | 5.940 | N/A |

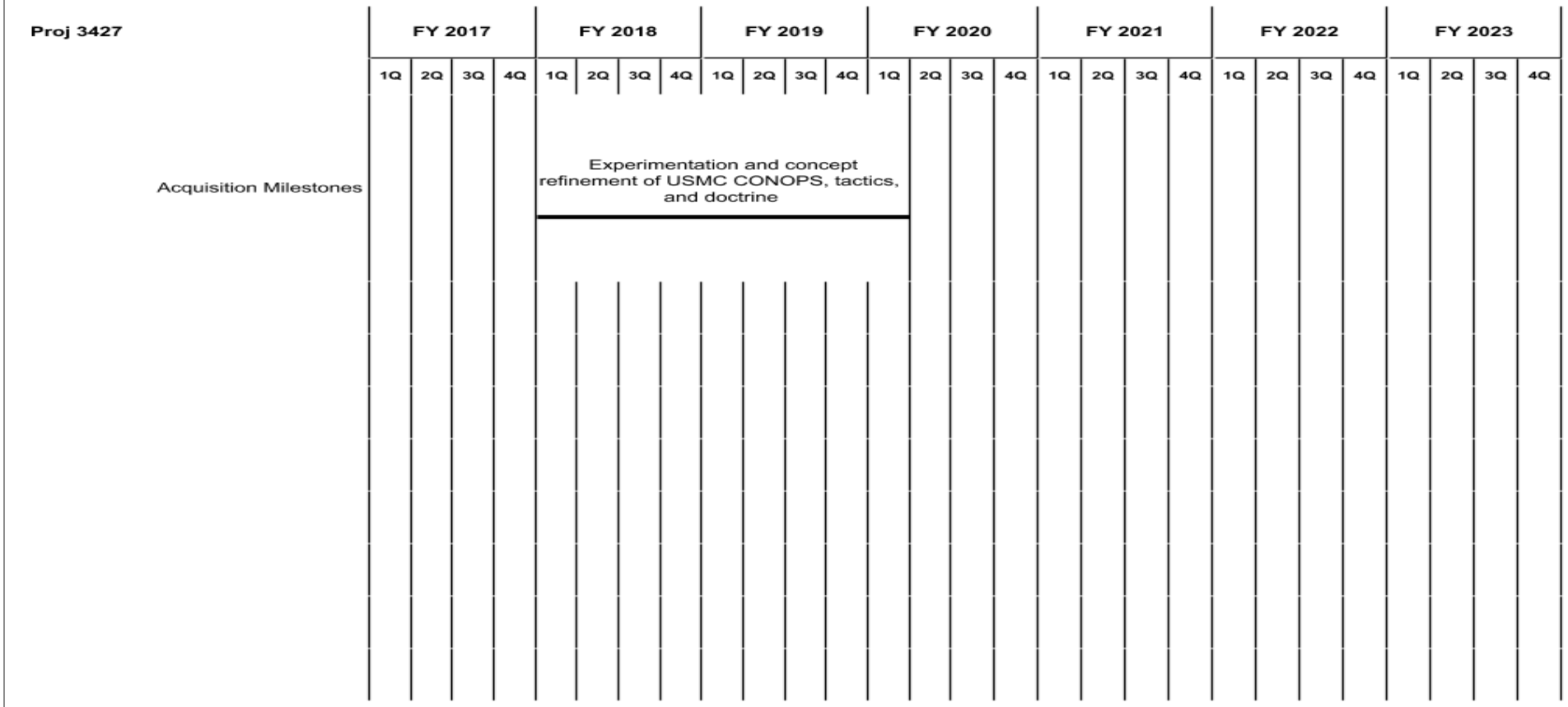
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Govt Engineering Support | WR | NAWCAD : Patuxent River, MD | 0.000 | 0.000 | | 0.410 | Jan 2018 | 0.474 | Nov 2018 | - | | 0.474 | 0.000 | 0.884 | - |
| Program Management Support | Various | Various : Various | 0.000 | 0.000 | | 0.445 | Jan 2018 | 0.450 | Nov 2018 | - | | 0.450 | 0.000 | 0.895 | - |
| Travel | WR | NAWCAD : Patuxent River, MD | 0.000 | 0.000 | | 0.055 | Jan 2018 | 0.080 | Nov 2018 | - | | 0.080 | 0.000 | 0.135 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.910 | | 1.004 | | - | | 1.004 | 0.000 | 1.914 | N/A |

| | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 3.001 | | 4.853 | | - | | 4.853 | 0.000 | 7.854 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0304240M / *(U)Advanced Tactical Unmanned Aircraft System* | **Project (Number/Name)**<br>3427 / *KMAX Experimentation and Support* |




*2019PB - 0304240M - 3427*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0304240M / *(U)Advanced Tactical Unmanned Aircraft System* | **Project (Number/Name)**<br>3427 / *KMAX Experimentation and Support* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3427*** | | | | |
| Acquisition Milestones: Experimentation and concept refinement of USMC CONOPS, tactics, and doctrine | 1 | 2018 | 1 | 2020 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 0304240N *I (U)Advanced Tactical Unmanned Aircraft System* |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Program Element | 0.000 | 0.000 | 0.000 | 9.300 | - | 9.300 | 14.400 | 0.000 | 0.000 | 0.000 | 0.000 | 23.700 |
| 3429: *TERN UAS* | 0.000 | 0.000 | 0.000 | 9.300 | - | 9.300 | 14.400 | 0.000 | 0.000 | 0.000 | 0.000 | 23.700 |

**A. Mission Description and Budget Item Justification**

This program element provides for the continued maturation and experimentation of Medium Altitude Long Endurance (MALE) Unmanned Aerial Vehicle (UAV) Concept Demonstrator to assess military utility of this technology to meet Navy and Battle Group Commander Warfighting gaps when executing Distributed Maritime Operations. The MALE UAV Technology Demonstrator will also inform requirements for an aviation family of systems to support the Future Surface Combatant (FSC). This project is a Military Intelligence Program.

Project 3429 - This project provides for trade studies, analysis, and continued testing, experimentation, and concept refinement to inform a long term solution for aviation support to Distributed Maritime Operations. A candidate technological concept is being designed by Defense Advanced Research Projects Agency (DARPA) and the Office of Naval Research (ONR) with additional funding provided by the Navy to further mature and assess the technology for Navy missions in a ship based environment. The DARPA/ONR technology concept is a Tactically Exploited Reconnaissance Node (TERN) program and will be the basis for MALE maturation and experimentation. The project name will be revised in the next budget submission.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 0.000 | 0.000 | 0.000 | - | 0.000 |
| Current President's Budget | 0.000 | 0.000 | 9.300 | - | 9.300 |
| Total Adjustments | 0.000 | 0.000 | 9.300 | - | 9.300 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | - | - | | | |
| • Rate/Misc Adjustments | 0.000 | 0.000 | 9.300 | - | 9.300 |

**Change Summary Explanation**

Schedule:
Project 3429 - Establishes the MALE (TERN) project unit.

Technical: Not applicable

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0304240N / *(U)Advanced Tactical Unmanned Aircraft System* | Project (Number/Name)<br>3429 / *TERN UAS* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3429: *TERN UAS* | 0.000 | 0.000 | 0.000 | 9.300 | - | 9.300 | 14.400 | 0.000 | 0.000 | 0.000 | 0.000 | 23.700 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

The goal of this program is to develop a Concept Demonstrator UAV, and perform technical demonstration of a Medium-Altitude, Long-Endurance Unmanned Aerial Vehicle (MALE UAV) capability from smaller ships. The program will demonstrate the technology for launch and recovery of large unmanned aircraft capable of providing persistent 24/7 Intelligence, Surveillance, and Reconnaissance (ISR) and strike capabilities at long radius orbits. Extending the ISR/strike radius while simultaneously increasing time on station beyond current capabilities from smaller ships will enable novel operational concepts including maritime surveillance and responsive, persistent deep overland ISR and strike, without requirement for forward basing. To achieve these goals, the program will investigate new concepts for aircraft launch and recovery, aircraft logistics and maintenance, and aircraft flight in regimes associated with maritime operating conditions.

MALE technologies have been under development by the Defense Advanced Research Projects Agency (DARPA) and the Office of Naval Research to prove basic capability; the Navy will fund mission utility assessments and envelope expansion and to assess this technology's ability to meet Navy and COCOM warfighting gaps. The MALE UAV Technology Demonstrator will also inform requirements for an aviation family of systems to support the Future Surface Combatant (FSC) POR and Distributed Maritime Operations.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** MALE (TERN) UAV Technical Maturation and Experimentation | 0.000 | 0.000 | 8.350 | 0.000 | 8.350 |
| ***Articles:*** | - | - | - | - | - |
| ***FY 2018 Plans:***<br>N/A | | | | | |
| ***FY 2019 Base Plans:***<br>The funding provides the Government and industry teams for continued aircraft trade studies, concept refinement, technology maturation, aircraft experimentation and testing, envelope expansion, and potential payload integration for meeting Navy mission requirements to inform the Navy's future Family of Systems (FOS). These efforts will also help refine objective performance requirements, initial Key Performance Parameters (KPP), CONOPS, concepts, tactics, doctrine, and reduce risk for the future ship-based UAV FOS. Provides architecture assessments for integrating the MALE ground and air segments to support interoperability with Navy | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0304240N / *(U)Advanced Tactical Unmanned Aircraft System* | **Project (Number/Name)**<br>3429 / *TERN UAS* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Common Control System (CCS). Other UAVs, such as MQ-8, may be used as an additional technology platform for maturation and experimentation efforts.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Increase from $0.000M to $8.350M results from a new start project unit. | | | | | |
| ***Title:*** Technical and Engineering Services<br>***Articles:***<br>***FY 2018 Plans:***<br>N/A<br>***FY 2019 Base Plans:***<br>Initiate and provide Government engineering support, contractor support, program support and travel for continued experimentation.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>Increase from $0.000M to $0.950M results from a new start project unit. | 0.000<br>- | 0.000<br>- | 0.950<br>- | 0.000<br>- | 0.950<br>- |
| **Accomplishments/Planned Programs Subtotals** | 0.000 | 0.000 | 9.300 | 0.000 | 9.300 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The program will continue experimentation efforts leveraging existing DARPA/ONR contracts targeted at Navy unique mission applications.

**E. Performance Metrics**

Performance metrics include successful completion of trade studies; successful demonstration of the minimum design criteria identified in the contracts, and ability to launch and recover in a sea-based environment.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0304240N / *(U)Advanced Tactical Unmanned Aircraft System* | Project (Number/Name)<br>3429 / *TERN UAS* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MALE (TERN) UAV Technical Maturation & Experimentation | C/CPIF | Northrop Grumman : San Diego, CA | 0.000 | 0.000 | | 0.000 | | 6.900 | Jan 2019 | - | | 6.900 | 10.800 | 17.700 | 17.700 |
| Requirements, Analysis, and Engineering Assessments | WR | NAWCAD : Patuxent River, MD | 0.000 | 0.000 | | 0.000 | | 1.450 | Oct 2018 | - | | 1.450 | 1.890 | 3.340 | 3.340 |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 8.350 | | - | | 8.350 | 12.690 | 21.040 | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Range Cost | WR | NAWCWD : Point Mugu, CA | 0.000 | 0.000 | | 0.000 | | 0.300 | Nov 2018 | - | | 0.300 | 0.900 | 1.200 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 0.300 | | - | | 0.300 | 0.900 | 1.200 | N/A |

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Government Engineering Support | WR | NAWCAD : Patuxent River, MD | 0.000 | 0.000 | | 0.000 | | 0.310 | Oct 2018 | - | | 0.310 | 0.470 | 0.780 | - |
| Program Management Support | Various | Various : Various | 0.000 | 0.000 | | 0.000 | | 0.250 | Oct 2018 | - | | 0.250 | 0.250 | 0.500 | - |
| Travel | WR | NAWCAD : Patuxent River, MD | 0.000 | 0.000 | | 0.000 | | 0.090 | Nov 2018 | - | | 0.090 | 0.090 | 0.180 | - |
| | | **Subtotal** | 0.000 | 0.000 | | 0.000 | | 0.650 | | - | | 0.650 | 0.810 | 1.460 | N/A |

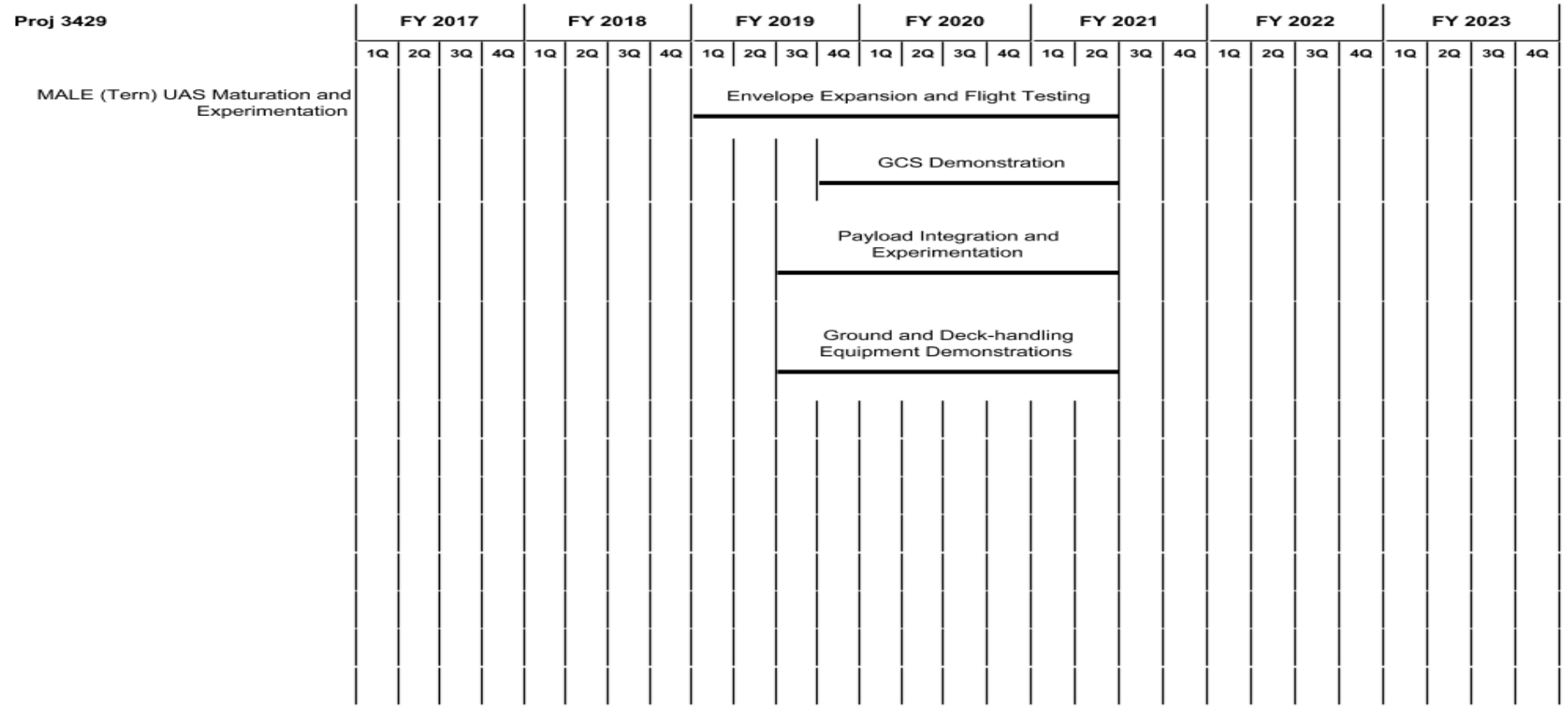
| | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 0.000 | | 0.000 | | 9.300 | | - | | 9.300 | 14.400 | 23.700 | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0304240N / *(U)Advanced Tactical Unmanned Aircraft System* | Project (Number/Name)<br>3429 / *TERN UAS* | |

| | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0304240N / *(U)Advanced Tactical Unmanned Aircraft System* | **Project (Number/Name)**<br>3429 / *TERN UAS* |




*2019PB - 0304240N - 3429*

| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0304240N / *(U)Advanced Tactical Unmanned Aircraft System* | **Project (Number/Name)**<br>3429 / *TERN UAS* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 3429*** | | | | |
| MALE (TERN) UAS Maturation and Experimentation: Envelope Expansion and Flight Testing | 1 | 2019 | 2 | 2021 |
| MALE (TERN) UAS Maturation and Experimentation: Ground Control System Demonstration | 4 | 2019 | 2 | 2021 |
| MALE (TERN) UAS Maturation and Experimentation: Payload Integration and Experimentation | 3 | 2019 | 2 | 2021 |
| MALE (TERN) UAS Maturation and Experimentation: Ground and Deck-handling Equipment Demonstrations | 3 | 2019 | 2 | 2021 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | | R-1 Program Element (Number/Name)<br>PE 0304270N *I Electronic Warfare Development - MIP* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2017** | **FY 2018** | **FY 2019 Base** | **FY 2019 OCO** | **FY 2019 Total** | **FY 2020** | **FY 2021** | **FY 2022** | **FY 2023** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 4.531 | 0.437 | 0.527 | 0.466 | - | 0.466 | 0.552 | 0.569 | 0.571 | 0.598 | Continuing | Continuing |
| 2260: *Specific Emitter ID* | 4.531 | 0.437 | 0.527 | 0.466 | - | 0.466 | 0.552 | 0.569 | 0.571 | 0.598 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

This project supports systems development and collection of Specific Emitter Identification (SEI) information from National Technical Means (NTM) to track commercial ships over 200 gross registered tons world-wide. Research and development will cover improvements and enhancements to Electronic Intelligence technology. This will include improved/next generation SEI technology for miniaturization and automation of hardware, national collection systems, signal processing and analysis, and de-interleaving of signals. Propagation in a multi-path signal environment will also be assessed. All work on this project will be undertaken in pursuit of goals stated by the Office of Naval Intelligence and the National Security Agency in support of the Worldwide Ship Tracking Program.

This PE is a Military Intelligence Program (MIP).

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 0.437 | 0.527 | 0.519 | - | 0.519 |
| Current President's Budget | 0.437 | 0.527 | 0.466 | - | 0.466 |
| Total Adjustments | 0.000 | 0.000 | -0.053 | - | -0.053 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | - | - | | | |
| • Rate/Misc Adjustments | 0.000 | 0.000 | -0.053 | - | -0.053 |

**Change Summary Explanation**

Technical: Not applicable.

Schedule: Not applicable.

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>1319 / 4 | R-1 Program Element (Number/Name)<br>PE 0304270N / *Electronic Warfare Development - MIP* | Project (Number/Name)<br>2260 / *Specific Emitter ID* | |

| COST ($ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2260: *Specific Emitter ID* | 4.531 | 0.437 | 0.527 | 0.466 | - | 0.466 | 0.552 | 0.569 | 0.571 | 0.598 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

**A. Mission Description and Budget Item Justification**

This project supports systems development and collection of Specific Emitter Identification (SEI) information from National Technical Means (NTM) to track commercial ships over 200 gross registered tons world-wide. Research and development will cover improvements and enhancements to Electronic Intelligence technology. This will include improved/next generation SEI technology for miniaturization and automation of hardware, national collection systems, signal processing and analysis, and de-interleaving of signals. Propagation in a multi-path signal environment will also be assessed. All work on this project will be undertaken in pursuit of goals stated by the Office of Naval Intelligence and the National Security Agency in support of the Worldwide Ship Tracking Program.

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Title:*** SENSOR FUSION | 0.135 | 0.145 | 0.130 | 0.000 | 0.130 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** This effort supports systems development and information fusion of improved Specific Emitter Identification (SEI) technology for automation of hardware, national collection systems, signal processing and analysis, and de-interleaving of signals.<br><br>***FY 2018 Plans:***<br>- Continue task to fuse additional sources of data with Specific Emitter Identification (SEI) data for automation of hardware, national collection systems, signal processing and analysis, and de-interleaving of signals. Work toward increasing sensor fusion, collection and reporting automation helped reduce staffing and support remote access and control capability.<br><br>***FY 2019 Base Plans:***<br>This subarea develops Specific Emitter Identification (SEI) technology for automation of hardware, national collection systems, signal processing and analysis, and de-interleaving of signals.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>N/A | | | | | |
| ***Title:*** SYSTEM AUTOMATION | 0.153 | 0.166 | 0.149 | 0.000 | 0.149 |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0304270N / *Electronic Warfare Development - MIP* | **Project (Number/Name)**<br>2260 / *Specific Emitter ID* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** This effort supports development of an autonomous surveillance system capable of providing emitter signal information to a central location.<br><br>***FY 2018 Plans:***<br>-Continue all task to develop an unmanned, autonomous, remote collection and surveillance system.<br>-Continue task to automate fusion of other sensor information with Specific Emitter Identification (SEI) data collection.<br><br>***FY 2019 Base Plans:***<br>This subarea develops an autonomous surveillance system that provides emitter signal information to a central location.<br><br>***FY 2019 OCO Plans:***<br>N/A<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>N/A | | | | | |
| ***Title:*** TECHNOLOGY REFRESH & COMMUNICATION ENHANCEMENT | 0.149 | 0.216 | 0.187 | 0.000 | 0.187 |
| ***Articles:*** | - | - | - | - | - |
| ***Description:*** This effort improves Specific Emitter Identification (SEI) system performance, real-time communication and tactical use of SEI which will be expanded with next generation SEI technology.<br><br>***FY 2018 Plans:***<br>-Continue task to incorporate other Specific Emitter Identification (SEI) algorithms into deployed processing software.<br>-Continue task on integrating advanced SEI hardware with WinSEI software to support improved SEI system performance and capabilities for tactical and technical use, and which can be expanded with next generation SEI algorithms.<br>-Continue task to expand collection capability to support additional radar types.<br>-Continue task to provide software enhancements to improve SEI system performance based on mission needs and requirements, user inputs, and platform environment.<br><br>***FY 2019 Base Plans:*** | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0304270N / *Electronic Warfare Development - MIP* | **Project (Number/Name)**<br>2260 / *Specific Emitter ID* |

| B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| This subarea improves Specific Emitter Identification (SEI) system performance, real-time communication and tactical use of SEI.<br>***FY 2019 OCO Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>N/A | | | | | |
| **Accomplishments/Planned Programs Subtotals** | 0.437 | 0.527 | 0.466 | 0.000 | 0.466 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Not applicable.

**E. Performance Metrics**

MIP Program.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0304270N / *Electronic Warfare Development - MIP* | **Project (Number/Name)**<br>2260 / *Specific Emitter ID* |

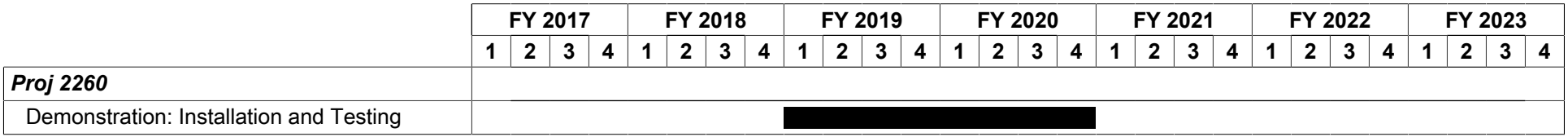
**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NRL | TBD | Not Specified : Not Specified | 4.531 | 0.437 | Jan 2017 | 0.527 | Jan 2018 | 0.466 | Jan 2019 | - | | 0.466 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 4.531 | 0.437 | | 0.527 | | 0.466 | | - | | 0.466 | Continuing | Continuing | N/A |

| | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 4.531 | 0.437 | | 0.527 | | 0.466 | | - | | 0.466 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0304270N / *Electronic Warfare Development - MIP* | **Project (Number/Name)**<br>2260 / *Specific Emitter ID* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>1319 / 4 | **R-1 Program Element (Number/Name)**<br>PE 0304270N / *Electronic Warfare Development - MIP* | **Project (Number/Name)**<br>2260 / *Specific Emitter ID* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***Proj 2260*** | | | | |
| Demonstration: Installation and Testing | 1 | 2019 | 4 | 2020 |

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