Department of Defense
Fiscal Year (FY) 2018 Budget Estimates

May 2017

Navy

Justification Book Volume 2 of 5

Research, Development, Test & Evaluation, Navy

Budget Activity 4

The estimated cost for this report or the Department of Navy (ON) is $28,004.

he estimated total cost or supportin the ON bud et usti ication material is appro imately $1,142,960 or the 2017 iscal year. his includes $76,659 in supplies and $1,066,301 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, $18,805,400,000 to remain available for obligation until September 30, 2019.

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Department of Defense
FY 2018 President's Budget Request
Exhibit R-1 FY 2018 President's Budget Request
Total Obligational Authority
(Dollars in Thousands)

Appropriation	FY 2016 Base + OCO	FY 2017 PB Request with CR Adj Base	FY 2017 Total PB Requests* with CR Adj Base	FY 2017 PB Request with CR Adj OCO	FY 2017 Total PB Requests* with CR Adj OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj OCO
Research, Development, Test & Eval, Navy	18,333,041	18,076,818	18,376,384	35,747	163,447		163,447
Total Research, Development, Test & Evaluation	18,333,041	18,076,818	18,376,384	35,747	163,447		163,447
Other RDT&E Budget Activities Not Included in the Research, Development, Test and Evaluation Title							
National Defense Sealift Fund	36,289						
Total Not in Research, Development, Test & Evaluation	36,289						

Department of Defense
FY 2018 President's Budget Request
Exhibit R-1 FY 2018 President's Budget Request
Total Obligational Authority
(Dollars in Thousands)

Appropriation	FY 2017 Total PB Requests** with CR Adj Base+OCO+SAA	FY 2017 Total PB Requests* with CR Adj Base + OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj Base + OCO	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Research, Development, Test & Eval, Navy	18,112,565	18,539,831		18,539,831	17,675,035	130,365	17,805,400
Total Research, Development, Test & Evaluation	18,112,565	18,539,831		18,539,831	17,675,035	130,365	17,805,400
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 2018 President's Budget Request
Exhibit R-1 FY 2018 President's Budget Request
Total Obligational Authority
(Dollars in Thousands)

Summary Recap of Budget Activities	FY 2016 Base + OCO	FY 2017 PB Request with CR Adj Base	FY 2017 Total PB Requests* with CR Adj Base	FY 2017 PB Request with CR Adj OCO	FY 2017 Total PB Requests* with CR Adj OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj OCO
Basic Research	648,642	542,970	542,970				
Applied Research	951,575	861,151	861,151				
Advanced Technology Development	680,933	736,988	736,988				
Advanced Component Development & Prototypes	4,929,981	4,662,867	4,707,367	41,897	77,397		77,397
System Development & Demonstration	6,236,999	6,025,655	6,112,003				
Management Support	1,286,493	853,736	918,322				
Operational Systems Development	3,598,418	3,592,934	3,697,066	36,426	128,626		128,626
Undistributed		800,517	800,517	-42,576	-42,576		-42,576
Total Research, Development, Test & Evaluation	18,333,041	18,076,818	18,376,384	35,747	163,447		163,447
Summary Recap of FYDP Programs							
Strategic Forces	162,023	196,948	196,948				
General Purpose Forces	1,328,376	1,447,043	1,514,004				
Intelligence and Communications	818,572	713,042	713,042				
Research and Development	14,468,006	13,638,282	13,833,716	41,897	77,397		77,397
Central Supply and Maintenance	27,563	52,526	52,526				
Administration and Associated Activities	569	800,517	800,517	-42,576	-42,576		-42,576
Space							
Classified Programs	1,527,932	1,228,460	1,265,631	36,426	128,626		128,626
Total Research, Development, Test & Evaluation	18,333,041	18,076,818	18,376,384	35,747	163,447		163,447

Department of Defense
FY 2018 President's Budget Request
Exhibit R-1 FY 2018 President's Budget Request
Total Obligational Authority
(Dollars in Thousands)

Summary Recap of Budget Activities	FY 2017 Total PB Requests** with CR Adj Base+OCO+SAA	FY 2017 Total PB Requests* with CR Adj Base + OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj Base + OCO	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Basic Research	542,970	542,970		542,970	595,901		595,901
Applied Research	861,151	861,151		861,151	886,079		886,079
Advanced Technology Development	736,988	736,988		736,988	686,342		686,342
Advanced Component Development & Prototypes	4,704,764	4,784,764		4,784,764	4,218,714	27,710	4,246,424
System Development & Demonstration	6,025,655	6,112,003		6,112,003	6,362,102		6,362,102
Management Support	853,736	918,322		918,322	945,757		945,757
Operational Systems Development	3,629,360	3,825,692		3,825,692	3,980,140	102,655	4,082,795
Undistributed	757,941	757,941		757,941			
Total Research, Development, Test & Evaluation	18,112,565	18,539,831		18,539,831	17,675,035	130,365	17,805,400
Summary Recap of FYDP Programs							
Strategic Forces	196,948	196,948		196,948	201,735		201,735
General Purpose Forces	1,447,043	1,514,004		1,514,004	1,675,797	12,800	1,688,597
Intelligence and Communications	713,042	713,042		713,042	751,779		751,779
Research and Development	13,680,179	13,911,113		13,911,113	13,589,349	27,710	13,617,059
Central Supply and Maintenance	52,526	52,526		52,526	43,035		43,035
Administration and Associated Activities	757,941	757,941		757,941	1,749		1,749
Space					47,244		47,244
Classified Programs	1,264,886	1,394,257		1,394,257	1,364,347	89,855	1,454,202
Total Research, Development, Test & Evaluation	18,112,565	18,539,831		18,539,831	17,675,035	130,365	17,805,400

Department of Defense
FY 2018 President's Budget Request
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Total Obligational Authority
(Dollars in Thousands)

	FY 2016 Base + OCO	FY 2017 PB Request with CR Adj Base	FY 2017 Total PB Requests* with CR Adj Base	FY 2017 PB Request with CR Adj OCO	FY 2017 Total PB Requests* with CR Adj OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj OCO
Summary Recap of Non-RDT&E Title FYDP Programs							
Mobility Forces	36,289						
Total Research, Development, Test & Evaluation	36,289						

Department of Defense
FY 2018 President's Budget Request
Exhibit R-1 FY 2018 President's Budget Request
Total Obligational Authority
(Dollars in Thousands)

	FY 2017 Total PB Requests** with CR Adj Base+OCO+SAA	FY 2017 Total PB Requests* with CR Adj Base + OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj Base + OCO	FY 2018 Base	FY 2018 OCO	FY 2018 Total
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 2018 President's Budget Request
Exhibit R-1 FY 2018 President's Budget Request
Total Obligational Authority
(Dollars in Thousands)

Summary Recap of Budget Activities	FY 2016 Base + OCO	FY 2017 PB Request with CR Adj Base	FY 2017 Total PB Requests* with CR Adj Base	FY 2017 PB Request with CR Adj OCO	FY 2017 Total PB Requests* with CR Adj OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj OCO
Basic Research	648,642	542,970	542,970				
Applied Research	951,575	861,151	861,151				
Advanced Technology Development	680,933	736,988	736,988				
Advanced Component Development & Prototypes	4,929,981	4,662,867	4,707,367	41,897	77,397		77,397
System Development & Demonstration	6,236,999	6,025,655	6,112,003				
Management Support	1,286,493	853,736	918,322				
Operational Systems Development	3,598,418	3,592,934	3,697,066	36,426	128,626		128,626
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Total Research, Development, Test & Evaluation	18,333,041	18,076,818	18,376,384	35,747	163,447		163,447
Summary Recap of FYDP Programs							
Strategic Forces	162,023	196,948	196,948				
General Purpose Forces	1,328,376	1,447,043	1,514,004				
Intelligence and Communications	818,572	713,042	713,042				
Research and Development	14,468,006	13,638,282	13,833,716	41,897	77,397		77,397
Central Supply and Maintenance	27,563	52,526	52,526				
Administration and Associated Activities	569	800,517	800,517	-42,576	-42,576		-42,576
Space							
Classified Programs	1,527,932	1,228,460	1,265,631	36,426	128,626		128,626
Total Research, Development, Test & Evaluation	18,333,041	18,076,818	18,376,384	35,747	163,447		163,447

Department of the Navy
FY 2018 President's Budget Request
Exhibit R-1 FY 2018 President's Budget Request
Total Obligational Authority
(Dollars in Thousands)

Summary Recap of Budget Activities	FY 2017 Total PB Requests** with CR Adj Base+OCO+SAA	FY 2017 Total PB Requests* with CR Adj Base + OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj Base + OCO	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Basic Research	542,970	542,970		542,970	595,901		595,901
Applied Research	861,151	861,151		861,151	886,079		886,079
Advanced Technology Development	736,988	736,988		736,988	686,342		686,342
Advanced Component Development & Prototypes	4,704,764	4,784,764		4,784,764	4,218,714	27,710	4,246,424
System Development & Demonstration	6,025,655	6,112,003		6,112,003	6,362,102		6,362,102
Management Support	853,736	918,322		918,322	945,757		945,757
Operational Systems Development	3,629,360	3,825,692		3,825,692	3,980,140	102,655	4,082,795
Undistributed	757,941	757,941		757,941			
Total Research, Development, Test & Evaluation	18,112,565	18,539,831		18,539,831	17,675,035	130,365	17,805,400
Summary Recap of FYDP Programs							
Strategic Forces	196,948	196,948		196,948	201,735		201,735
General Purpose Forces	1,447,043	1,514,004		1,514,004	1,675,797	12,800	1,688,597
Intelligence and Communications	713,042	713,042		713,042	751,779		751,779
Research and Development	13,680,179	13,911,113		13,911,113	13,589,349	27,710	13,617,059
Central Supply and Maintenance	52,526	52,526		52,526	43,035		43,035
Administration and Associated Activities	757,941	757,941		757,941	1,749		1,749
Space					47,244		47,244
Classified Programs	1,264,886	1,394,257		1,394,257	1,364,347	89,855	1,454,202
Total Research, Development, Test & Evaluation	18,112,565	18,539,831		18,539,831	17,675,035	130,365	17,805,400

Department of the Navy
FY 2018 President's Budget Request
Exhibit R-1 FY 2018 President's Budget Request
Total Obligational Authority
(Dollars in Thousands)

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

Line No	Program Element Number	Item	Act	FY 2016 Base + OCO	FY 2017 PB Request with CR Adj Base	FY 2017 Total PB Requests* with CR Adj Base	FY 2017 PB Request with CR Adj OCO	FY 2017 Total PB Requests* with CR Adj OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj OCO	Sec
1	0601103N	University Research Initiatives	01	140,998	101,714	101,714					U
2	0601152N	In-House Laboratory Independent Research	01	18,978	18,508	18,508					U
3	0601153N	Defense Research Sciences	01	488,666	422,748	422,748					U
	Basic	Research		648,642	542,970	542,970					
4	0602114N	Power Projection Applied Research	02	88,940	41,371	41,371					U
5	0602123N	Force Protection Applied Research	02	174,447	158,745	158,745					U
6	0602131M	Marine Corps Landing Force Technology	02	50,164	51,590	51,590					U
7	0602235N	Common Picture Applied Research	02	42,973	41,185	41,185					U
8	0602236N	Warfighter Sustainment Applied Research	02	44,092	45,467	45,467					U
9	0602271N	Electromagnetic Systems Applied Research	02	116,362	118,941	118,941					U
10	0602435N	Ocean Warfighting Environment Applied Research	02	69,703	42,618	42,618					U
11	0602651M	Joint Non-Lethal Weapons Applied Research	02	5,956	6,327	6,327					U
12	0602747N	Undersea Warfare Applied Research	02	151,844	126,313	126,313					U
13	0602750N	Future Naval Capabilities Applied Research	02	172,511	165,103	165,103					U
14	0602782N	Mine and Expeditionary Warfare Applied Research	02	34,583	33,916	33,916					U
15	0602792N	Innovative Naval Prototypes (INP) Applied Research	02								U

Department of the Navy
FY 2018 President's Budget Request
Exhibit R-1 FY 2018 President's Budget Request
Total Obligational Authority
(Dollars in Thousands)

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

Line No	Program Element Number	Item	Act	FY 2017 Total PB Requests** with CR Adj Base+OCO+SAA	FY 2017 Total PB Requests* with CR Adj Base + OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj Base + OCO	FY 2018 Base	FY 2018 OCO	FY 2018 Total	Sec
1	0601103N	University Research Initiatives	01	101,714	101,714		101,714	118,130		118,130	U
2	0601152N	In-House Laboratory Independent Research	01	18,508	18,508		18,508	19,438		19,438	U
3	0601153N	Defense Research Sciences	01	422,748	422,748		422,748	458,333		458,333	U
	Basic	Research		542,970	542,970		542,970	595,901		595,901	
4	0602114N	Power Projection Applied Research	02	41,371	41,371		41,371	13,553		13,553	U
5	0602123N	Force Protection Applied Research	02	158,745	158,745		158,745	125,557		125,557	U
6	0602131M	Marine Corps Landing Force Technology	02	51,590	51,590		51,590	53,936		53,936	U
7	0602235N	Common Picture Applied Research	02	41,185	41,185		41,185	36,450		36,450	U
8	0602236N	Warfighter Sustainment Applied Research	02	45,467	45,467		45,467	48,649		48,649	U
9	0602271N	Electromagnetic Systems Applied Research	02	118,941	118,941		118,941	79,598		79,598	U
10	0602435N	Ocean Warfighting Environment Applied Research	02	42,618	42,618		42,618	42,411		42,411	U
11	0602651M	Joint Non-Lethal Weapons Applied Research	02	6,327	6,327		6,327	6,425		6,425	U
12	0602747N	Undersea Warfare Applied Research	02	126,313	126,313		126,313	56,094		56,094	U
13	0602750N	Future Naval Capabilities Applied Research	02	165,103	165,103		165,103	156,805		156,805	U
14	0602782N	Mine and Expeditionary Warfare Applied Research	02	33,916	33,916		33,916	32,733		32,733	U
15	0602792N	Innovative Naval Prototypes (INP) Applied Research	02					171,146		171,146	U

Department of the Navy
FY 2018 President's Budget Request
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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 2016 Base + OCO	FY 2017 PB Request with CR Adj Base	FY 2017 Total PB Requests* with CR Adj Base	FY 2017 PB Request with CR Adj OCO	FY 2017 Total PB Requests* with CR Adj OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj OCO	Sec
16	0602861N	Science and Technology Management - ONR Field Acitivities	02								U
17	0602898N	Science and Technology Management - ONR Headquarters	02		29,575	29,575					U
	Applied Research			951,575	861,151	861,151					
18	0603114N	Power Projection Advanced Technology	03	41,957	96,406	96,406					U
19	0603123N	Force Protection Advanced Technology	03	42,333	48,438	48,438					U
20	0603271N	Electromagnetic Systems Advanced Technology	03	32,924	26,421	26,421					U
21	0603640M	USMC Advanced Technology Demonstration (ATD)	03	128,386	140,416	140,416					U
22	0603651M	Joint Non-Lethal Weapons Technology Development	03	12,374	13,117	13,117					U
23	0603673N	Future Naval Capabilities Advanced Technology Development	03	251,173	249,092	249,092					U
24	0603680N	Manufacturing Technology Program	03	54,739	56,712	56,712					U
25	0603729N	Warfighter Protection Advanced Technology	03	34,894	4,789	4,789					U
26	0603747N	Undersea Warfare Advanced Technology	03	13,251	25,880	25,880					U
27	0603758N	Navy Warfighting Experiments and Demonstrations	03	65,553	60,550	60,550					U
28	0603782N	Mine and Expeditionary Warfare Advanced Technology	03	3,349	15,167	15,167					U

Department of the Navy
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(Dollars in Thousands)

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

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16	0602861N	Science and Technology Management - ONR Field Acitivities	02					62,722		62,722	U
17	0602898N	Science and Technology Management - ONR Headquarters	02	29,575	29,575		29,575				U
	Applied Research			861,151	861,151		861,151	886,079		886,079	
18	0603114N	Power Projection Advanced Technology	03	96,406	96,406		96,406				U
19	0603123N	Force Protection Advanced Technology	03	48,438	48,438		48,438	26,342		26,342	U
20	0603271N	Electromagnetic Systems Advanced Technology	03	26,421	26,421		26,421	9,360		9,360	U
21	0603640M	USMC Advanced Technology Demonstration (ATD)	03	140,416	140,416		140,416	154,407		154,407	U
22	0603651M	Joint Non-Lethal Weapons Technology Development	03	13,117	13,117		13,117	13,448		13,448	U
23	0603673N	Future Naval Capabilities Advanced Technology Development	03	249,092	249,092		249,092	231,772		231,772	U
24	0603680N	Manufacturing Technology Program	03	56,712	56,712		56,712	57,797		57,797	U
25	0603729N	Warfighter Protection Advanced Technology	03	4,789	4,789		4,789	4,878		4,878	U
26	0603747N	Undersea Warfare Advanced Technology	03	25,880	25,880		25,880				U
27	0603758N	Navy Warfighting Experiments and Demonstrations	03	60,550	60,550		60,550	64,889		64,889	U
28	0603782N	Mine and Expeditionary Warfare Advanced Technology	03	15,167	15,167		15,167	15,164		15,164	U

Department of the Navy
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(Dollars in Thousands)

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

Line No	Program Element Number	Item	Act	FY 2016 Base + OCO	FY 2017 PB Request with CR Adj Base	FY 2017 Total PB Requests* with CR Adj Base	FY 2017 PB Request with CR Adj OCO	FY 2017 Total PB Requests* with CR Adj OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj OCO	Sec
29	0603801N	Innovative Naval Prototypes (INP) Advanced Technology Development	03								U
		Advanced Technology Development		680,933	736,988	736,988					
30	0603207N	Air/Ocean Tactical Applications	04	37,126	48,536	48,536					U
31	0603216N	Aviation Survivability	04	5,343	5,239	5,239					U
32	0603237N	Deployable Joint Command and Control	04	3,051							U
33	0603251N	Aircraft Systems	04	25,763	1,519	1,519					U
34	0603254N	ASW Systems Development	04	5,455	7,041	7,041					U
35	0603261N	Tactical Airborne Reconnaissance	04	8,391	3,274	3,274					U
36	0603382N	Advanced Combat Systems Technology	04	1,572	57,034	57,034					U
37	0603502N	Surface and Shallow Water Mine Countermeasures	04	88,092	165,775	165,775					U
38	0603506N	Surface Ship Torpedo Defense	04	69,803	87,066	87,066					U
39	0603512N	Carrier Systems Development	04	8,213	7,605	7,605					U
40	0603525N	PILOT FISH	04	124,194	132,068	132,068					U
41	0603527N	RETRACT LARCH	04	39,475	14,546	14,546	3,907	35,907		35,907	U
42	0603536N	RETRACT JUNIPER	04	109,786	115,435	115,435					U
43	0603542N	Radiological Control	04	709	702	702					U
44	0603553N	Surface ASW	04	1,056	1,081	1,081					U
45	0603561N	Advanced Submarine System Development	04	85,496	100,565	106,365					U

Department of the Navy
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(Dollars in Thousands)

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29	0603801N	Innovative Naval Prototypes (INP) Advanced Technology Development	03					108,285		108,285	U
		Advanced Technology Development		736,988	736,988		736,988	686,342		686,342	
30	0603207N	Air/Ocean Tactical Applications	04	48,536	48,536		48,536	48,365		48,365	U
31	0603216N	Aviation Survivability	04	5,239	5,239		5,239	5,566		5,566	U
32	0603237N	Deployable Joint Command and Control	04								U
33	0603251N	Aircraft Systems	04	1,519	1,519		1,519	695		695	U
34	0603254N	ASW Systems Development	04	7,041	7,041		7,041	7,661		7,661	U
35	0603261N	Tactical Airborne Reconnaissance	04	3,274	3,274		3,274	3,707		3,707	U
36	0603382N	Advanced Combat Systems Technology	04	57,034	57,034		57,034	61,381		61,381	U
37	0603502N	Surface and Shallow Water Mine Countermeasures	04	165,775	165,775		165,775	154,117		154,117	U
38	0603506N	Surface Ship Torpedo Defense	04	87,066	87,066		87,066	14,974		14,974	U
39	0603512N	Carrier Systems Development	04	7,605	7,605		7,605	9,296		9,296	U
40	0603525N	PILOT FISH	04	132,068	132,068		132,068	132,083		132,083	U
41	0603527N	RETRACT LARCH	04	18,453	50,453		50,453	15,407	22,000	37,407	U
42	0603536N	RETRACT JUNIPER	04	115,435	115,435		115,435	122,413		122,413	U
43	0603542N	Radiological Control	04	702	702		702	745		745	U
44	0603553N	Surface ASW	04	1,081	1,081		1,081	1,136		1,136	U
45	0603561N	Advanced Submarine System Development	04	100,565	106,365		106,365	100,955		100,955	U

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46	0603562N	Submarine Tactical Warfare Systems	04	10,172	8,782	8,782					U
47	0603563N	Ship Concept Advanced Design	04	10,446	14,590	14,590					U
48	0603564N	Ship Preliminary Design & Feasibility Studies	04	3,213	15,805	15,805					U
49	0603570N	Advanced Nuclear Power Systems	04	482,040	453,313	453,313					U
50	0603573N	Advanced Surface Machinery Systems	04	23,443	36,655	36,655					U
51	0603576N	CHALK EAGLE	04	493,472	367,016	367,016					U
52	0603581N	Littoral Combat Ship (LCS)	04	109,426	51,630	51,630					U
53	0603582N	Combat System Integration	04	32,020	23,530	26,530					U
54	0603595N	Ohio Replacement	04	947,783	700,811	700,811					U
55	0603596N	LCS Mission Modules	04	188,872	160,058	160,058					U
56	0603597N	Automated Test and Analysis	04	22,188							U
57	0603599N	Frigate Development	04	18,965	84,900	84,900					U
58	0603609N	Conventional Munitions	04	7,676	8,342	8,342					U
59	0603611M	Marine Corps Assault Vehicles	04	196,991	158,682	158,682					U
60	0603635M	Marine Corps Ground Combat/Support System	04	359	1,303	1,303					U
61	0603654N	Joint Service Explosive Ordnance Development	04	14,957	46,911	46,911		3,500		3,500	U
62	0603658N	Cooperative Engagement	04	72,472							U
63	0603713N	Ocean Engineering Technology Development	04	5,135	4,556	4,556					U

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46	0603562N	Submarine Tactical Warfare Systems	04	8,782	8,782		8,782	13,834		13,834	U
47	0603563N	Ship Concept Advanced Design	04	14,590	14,590		14,590	36,891		36,891	U
48	0603564N	Ship Preliminary Design & Feasibility Studies	04	15,805	15,805		15,805	12,012		12,012	U
49	0603570N	Advanced Nuclear Power Systems	04	453,313	453,313		453,313	329,500		329,500	U
50	0603573N	Advanced Surface Machinery Systems	04	36,655	36,655		36,655	29,953		29,953	U
51	0603576N	CHALK EAGLE	04	367,016	367,016		367,016	191,610		191,610	U
52	0603581N	Littoral Combat Ship (LCS)	04	51,630	51,630		51,630	40,991		40,991	U
53	0603582N	Combat System Integration	04	23,530	26,530		26,530	24,674		24,674	U
54	0603595N	Ohio Replacement	04	700,811	700,811		700,811	776,158		776,158	U
55	0603596N	LCS Mission Modules	04	160,058	160,058		160,058	116,871		116,871	U
56	0603597N	Automated Test and Analysis	04					8,052		8,052	U
57	0603599N	Frigate Development	04	84,900	84,900		84,900	143,450		143,450	U
58	0603609N	Conventional Munitions	04	8,342	8,342		8,342	8,909		8,909	U
59	0603611M	Marine Corps Assault Vehicles	04	158,682	158,682		158,682				U
60	0603635M	Marine Corps Ground Combat/Support System	04	1,303	1,303		1,303	1,428		1,428	U
61	0603654N	Joint Service Explosive Ordnance Development	04	46,911	50,411		50,411	53,367		53,367	U
62	0603658N	Cooperative Engagement	04								U
63	0603713N	Ocean Engineering Technology Development	04	4,556	4,556		4,556	8,212		8,212	U

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64	0603721N	Environmental Protection	04	19,286	20,343	20,343					U
65	0603724N	Navy Energy Program	04	54,911	52,479	27,479					U
66	0603725N	Facilities Improvement	04	3,726	5,458	5,458					U
67	0603734N	CHALK CORAL	04	168,960	245,860	245,860					U
68	0603739N	Navy Logistic Productivity	04	3,728	3,089	3,089					U
69	0603746N	RETRACT MAPLE	04	340,897	323,526	323,526					U
70	0603748N	LINK PLUMERIA	04	192,336	318,497	318,497					U
71	0603751N	RETRACT ELM	04	36,086	52,834	52,834					U
72	0603764N	LINK EVERGREEN	04	45,603	48,116	48,116					U
73	0603787N	Special Processes	04	16,769	13,619	13,619					U
74	0603790N	NATO Research and Development	04	8,320	9,867	9,867					U
75	0603795N	Land Attack Technology	04	887	6,015	6,015					U
76	0603851M	Joint Non-Lethal Weapons Testing	04	27,976	27,904	27,904					U
77	0603860N	Joint Precision Approach and Landing Systems - Dem/Val	04	80,313	104,144	104,144					U
78	0603925N	Directed Energy and Electric Weapon Systems	04	41,355	32,700	32,700					U
79	0604112N	Gerald R. Ford Class Nuclear Aircraft Carrier (CVN 78 - 80)	04	95,408	70,528	70,528					U
80	0604122N	Remote Minehunting System (RMS)	04	16,940	3,001	3,001					U
81	0604272N	Tactical Air Directional Infrared Countermeasures (TADIRCM)	04	18,963	34,920	34,920	37,990	37,990		37,990	U

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64	0603721N	Environmental Protection	04	20,343	20,343		20,343	20,214		20,214	U
65	0603724N	Navy Energy Program	04	52,479	27,479		27,479	50,623		50,623	U
66	0603725N	Facilities Improvement	04	5,458	5,458		5,458	2,837		2,837	U
67	0603734N	CHALK CORAL	04	245,860	245,860		245,860	245,143		245,143	U
68	0603739N	Navy Logistic Productivity	04	3,089	3,089		3,089	2,995		2,995	U
69	0603746N	RETRACT MAPLE	04	323,526	323,526		323,526	306,101		306,101	U
70	0603748N	LINK PLUMERIA	04	318,497	318,497		318,497	253,675		253,675	U
71	0603751N	RETRACT ELM	04	52,834	52,834		52,834	55,691		55,691	U
72	0603764N	LINK EVERGREEN	04	48,116	48,116		48,116	48,982		48,982	U
73	0603787N	Special Processes	04	13,619	13,619		13,619				U
74	0603790N	NATO Research and Development	04	9,867	9,867		9,867	9,099		9,099	U
75	0603795N	Land Attack Technology	04	6,015	6,015		6,015	33,568		33,568	U
76	0603851M	Joint Non-Lethal Weapons Testing	04	27,904	27,904		27,904	29,873		29,873	U
77	0603860N	Joint Precision Approach and Landing Systems - Dem/Val	04	104,144	104,144		104,144	106,391		106,391	U
78	0603925N	Directed Energy and Electric Weapon Systems	04	32,700	32,700		32,700	107,310		107,310	U
79	0604112N	Gerald R. Ford Class Nuclear Aircraft Carrier (CVN 78 - 80)	04	70,528	70,528		70,528	83,935		83,935	U
80	0604122N	Remote Minehunting System (RMS)	04	3,001	3,001		3,001				U
81	0604272N	Tactical Air Directional Infrared Countermeasures (TADIRCM)	04	72,910	72,910		72,910	46,844	5,710	52,554	U

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82	0604279N	ASE Self-Protection Optimization	04	8,995							U
83	0604286M	Marine Corps Additive Manufacturing Technology Development	04								U
84	0604292N	MH-XX	04	4,462	1,620	1,620					U
85	0604320M	Rapid Technology Capability Prototype	04								U
86	0604454N	LX (R)	04	73,392	6,354	6,354					U
87	0604536N	Advanced Undersea Prototyping	04		78,589	78,589					U
88	0604653N	Joint Counter Radio Controlled IED Electronic Warfare (JCREW)	04	3,765							U
89	0604659N	Precision Strike Weapons Development Program	04	7,621	9,910	9,910					U
90	0604707N	Space and Electronic Warfare (SEW) Architecture/Engineering Support	04	22,214	23,971	23,971					U
91	0604786N	Offensive Anti-Surface Warfare Weapon Development	04	348,708	252,409	313,109					U
92	0605812M	Joint Light Tactical Vehicle (JLTV) Engineering and Manufacturing Development Ph	04	24,790	23,197	23,197					U
93	0303354N	ASW Systems Development - MIP	04	9,835	9,110	9,110					U
94	0304240M	Advanced Tactical Unmanned Aircraft System	04								U
95	0304270N	Electronic Warfare Development - MIP	04	580	437	437					U
		Advanced Component Development & Prototypes		4,929,981	4,662,867	4,707,367	41,897	77,397		77,397	
96	0603208N	Training System Aircraft	05	16,438	19,938	19,938					U

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82	0604279N	ASE Self-Protection Optimization	04								U
83	0604286M	Marine Corps Additive Manufacturing Technology Development	04					6,200		6,200	U
84	0604292N	MH-XX	04	1,620	1,620		1,620				U
85	0604320M	Rapid Technology Capability Prototype	04					7,055		7,055	U
86	0604454N	LX (R)	04	6,354	6,354		6,354	9,578		9,578	U
87	0604536N	Advanced Undersea Prototyping	04	78,589	78,589		78,589	66,543		66,543	U
88	0604653N	Joint Counter Radio Controlled IED Electronic Warfare (JCREW)	04								U
89	0604659N	Precision Strike Weapons Development Program	04	9,910	9,910		9,910	31,315		31,315	U
90	0604707N	Space and Electronic Warfare (SEW) Architecture/Engineering Support	04	23,971	23,971		23,971	42,851		42,851	U
91	0604786N	Offensive Anti-Surface Warfare Weapon Development	04	252,409	313,109		313,109	160,694		160,694	U
92	0605812M	Joint Light Tactical Vehicle (JLTV) Engineering and Manufacturing Development Ph	04	23,197	23,197		23,197				U
93	0303354N	ASW Systems Development - MIP	04	9,110	9,110		9,110	8,278		8,278	U
94	0304240M	Advanced Tactical Unmanned Aircraft System	04					7,979		7,979	U
95	0304270N	Electronic Warfare Development - MIP	04	437	437		437	527		527	U
		Advanced Component Development & Prototypes		4,704,764	4,784,764		4,784,764	4,218,714	27,710	4,246,424	
96	0603208N	Training System Aircraft	05	19,938	19,938		19,938	16,945		16,945	U

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97	0604212N	Other Helo Development	05	12,070	6,268	6,268					U
98	0604214N	AV-8B Aircraft - Eng Dev	05	26,939	33,664	34,902					U
99	0604215N	Standards Development	05	48,677	1,300	1,300					U
100	0604216N	Multi-Mission Helicopter Upgrade Development	05	17,518	5,275	5,275					U
101	0604218N	Air/Ocean Equipment Engineering	05	4,406	3,875	3,875					U
102	0604221N	P-3 Modernization Program	05	1,485	1,909	1,909					U
103	0604230N	Warfare Support System	05	5,740	13,237	13,237					U
104	0604231N	Tactical Command System	05	75,508	36,323	40,323					U
105	0604234N	Advanced Hawkeye	05	211,146	363,792	363,792					U
106	0604245N	H-1 Upgrades	05	26,768	27,441	27,441					U
107	0604261N	Acoustic Search Sensors	05	30,637	34,525	34,525					U
108	0604262N	V-22A	05	74,366	174,423	189,423					U
109	0604264N	Air Crew Systems Development	05	10,201	13,577	13,577					U
110	0604269N	EA-18	05	45,384	116,761	116,761					U
111	0604270N	Electronic Warfare Development	05	22,383	48,766	92,766					U
112	0604273N	Executive Helo Development	05	490,768	338,357	338,357					U
113	0604274N	Next Generation Jammer (NGJ)	05	376,548	577,822	577,822					U
114	0604280N	Joint Tactical Radio System - Navy (JTRS-Navy)	05	24,300	2,365	2,365					U
115	0604282N	Next Generation Jammer (NGJ) Increment II	05	12,306	52,065	52,065					U

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97	0604212N	Other Helo Development	05	6,268	6,268		6,268	26,786		26,786	U
98	0604214N	AV-8B Aircraft - Eng Dev	05	33,664	34,902		34,902	48,780		48,780	U
99	0604215N	Standards Development	05	1,300	1,300		1,300	2,722		2,722	U
100	0604216N	Multi-Mission Helicopter Upgrade Development	05	5,275	5,275		5,275	5,371		5,371	U
101	0604218N	Air/Ocean Equipment Engineering	05	3,875	3,875		3,875	782		782	U
102	0604221N	P-3 Modernization Program	05	1,909	1,909		1,909	1,361		1,361	U
103	0604230N	Warfare Support System	05	13,237	13,237		13,237	14,167		14,167	U
104	0604231N	Tactical Command System	05	36,323	40,323		40,323	55,695		55,695	U
105	0604234N	Advanced Hawkeye	05	363,792	363,792		363,792	292,535		292,535	U
106	0604245N	H-1 Upgrades	05	27,441	27,441		27,441	61,288		61,288	U
107	0604261N	Acoustic Search Sensors	05	34,525	34,525		34,525	37,167		37,167	U
108	0604262N	V-22A	05	174,423	189,423		189,423	171,386		171,386	U
109	0604264N	Air Crew Systems Development	05	13,577	13,577		13,577	13,235		13,235	U
110	0604269N	EA-18	05	116,761	116,761		116,761	173,488		173,488	U
111	0604270N	Electronic Warfare Development	05	48,766	92,766		92,766	54,055		54,055	U
112	0604273N	Executive Helo Development	05	338,357	338,357		338,357	451,938		451,938	U
113	0604274N	Next Generation Jammer (NGJ)	05	577,822	577,822		577,822	632,936		632,936	U
114	0604280N	Joint Tactical Radio System - Navy (JTRS-Navy)	05	2,365	2,365		2,365	4,310		4,310	U
115	0604282N	Next Generation Jammer (NGJ) Increment II	05	52,065	52,065		52,065	66,686		66,686	U

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116	0604307N	Surface Combatant Combat System Engineering	05	430,450	282,764	282,764					U
117	0604311N	LPD-17 Class Systems Integration	05	730	580	580					U
118	0604329N	Small Diameter Bomb (SDB)	05	55,818	97,622	97,622					U
119	0604366N	Standard Missile Improvements	05	111,295	120,561	120,561					U
120	0604373N	Airborne MCM	05	9,399	45,622	45,622					U
121	0604376M	Marine Air Ground Task Force (MAGTF) Electronic Warfare (EW) for Aviation	05	3,281							U
122	0604378N	Naval Integrated Fire Control - Counter Air Systems Engineering	05	22,960	25,750	25,750					U
123	0604404N	Unmanned Carrier Launched Airborne Surveillance and Strike (UCLASS) System	05	414,376							U
124	0604501N	Advanced Above Water Sensors	05	42,796	85,868	85,868					U
125	0604503N	SSN-688 and Trident Modernization	05	106,342	117,476	117,476					U
126	0604504N	Air Control	05	55,947	47,404	47,404					U
127	0604512N	Shipboard Aviation Systems	05	117,401	112,158	112,158					U
128	0604518N	Combat Information Center Conversion	05		6,283	6,283					U
129	0604522N	Air and Missile Defense Radar (AMDR) System	05	227,051	144,395	144,395					U
130	0604558N	New Design SSN	05	150,442	113,013	113,013					U
131	0604562N	Submarine Tactical Warfare System	05	51,054	43,160	43,160					U
132	0604567N	Ship Contract Design/ Live Fire T&E	05	38,060	65,002	63,311					U

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116	0604307N	Surface Combatant Combat System Engineering	05	282,764	282,764		282,764	390,238		390,238	U
117	0604311N	LPD-17 Class Systems Integration	05	580	580		580	689		689	U
118	0604329N	Small Diameter Bomb (SDB)	05	97,622	97,622		97,622	112,846		112,846	U
119	0604366N	Standard Missile Improvements	05	120,561	120,561		120,561	158,578		158,578	U
120	0604373N	Airborne MCM	05	45,622	45,622		45,622	15,734		15,734	U
121	0604376M	Marine Air Ground Task Force (MAGTF) Electronic Warfare (EW) for Aviation	05								U
122	0604378N	Naval Integrated Fire Control - Counter Air Systems Engineering	05	25,750	25,750		25,750	25,445		25,445	U
123	0604404N	Unmanned Carrier Launched Airborne Surveillance and Strike (UCLASS) System	05								U
124	0604501N	Advanced Above Water Sensors	05	85,868	85,868		85,868	87,233		87,233	U
125	0604503N	SSN-688 and Trident Modernization	05	117,476	117,476		117,476	130,981		130,981	U
126	0604504N	Air Control	05	47,404	47,404		47,404	75,186		75,186	U
127	0604512N	Shipboard Aviation Systems	05	112,158	112,158		112,158	177,926		177,926	U
128	0604518N	Combat Information Center Conversion	05	6,283	6,283		6,283	8,062		8,062	U
129	0604522N	Air and Missile Defense Radar (AMDR) System	05	144,395	144,395		144,395	32,090		32,090	U
130	0604558N	New Design SSN	05	113,013	113,013		113,013	120,087		120,087	U
131	0604562N	Submarine Tactical Warfare System	05	43,160	43,160		43,160	50,850		50,850	U
132	0604567N	Ship Contract Design/ Live Fire T&E	05	65,002	63,311		63,311	67,166		67,166	U

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133	0604574N	Navy Tactical Computer Resources	05	4,053	3,098	3,098					U
134	0604580N	Virginia Payload Module (VPM)	05	162,168	97,920	97,920					U
135	0604601N	Mine Development	05	12,602	10,490	15,290					U
136	0604610N	Lightweight Torpedo Development	05	42,548	20,178	20,178					U
137	0604654N	Joint Service Explosive Ordnance Development	05	8,123	7,369	7,369					U
138	0604703N	Personnel, Training, Simulation, and Human Factors	05	7,408	4,995	18,995					U
139	0604727N	Joint Standoff Weapon Systems	05	394	412	412					U
140	0604755N	Ship Self Defense (Detect & Control)	05	145,229	134,619	134,619					U
141	0604756N	Ship Self Defense (Engage: Hard Kill)	05	93,481	114,475	114,475					U
142	0604757N	Ship Self Defense (Engage: Soft Kill/EW)	05	100,153	114,211	114,211					U
143	0604761N	Intelligence Engineering	05	2,053	11,029	13,029					U
144	0604771N	Medical Development	05	24,658	9,220	9,221					U
145	0604777N	Navigation/ID System	05	32,339	42,723	42,723					U
146	0604800M	Joint Strike Fighter (JSF) - EMD	05	526,247	531,426	531,426					U
147	0604800N	Joint Strike Fighter (JSF) - EMD	05	488,703	528,716	528,716					U
148	0604810M	Joint Strike Fighter Follow On Modernization (FoM) - Marine Corps	05	20,157	74,227	74,227					U
149	0604810N	Joint Strike Fighter Follow On Modernization (FoM) - Navy	05	20,544	63,387	63,387					U

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133	0604574N	Navy Tactical Computer Resources	05	3,098	3,098		3,098	4,817		4,817	U
134	0604580N	Virginia Payload Module (VPM)	05	97,920	97,920		97,920	72,861		72,861	U
135	0604601N	Mine Development	05	10,490	15,290		15,290	25,635		25,635	U
136	0604610N	Lightweight Torpedo Development	05	20,178	20,178		20,178	28,076		28,076	U
137	0604654N	Joint Service Explosive Ordnance Development	05	7,369	7,369		7,369	7,561		7,561	U
138	0604703N	Personnel, Training, Simulation, and Human Factors	05	4,995	18,995		18,995	40,828		40,828	U
139	0604727N	Joint Standoff Weapon Systems	05	412	412		412	435		435	U
140	0604755N	Ship Self Defense (Detect & Control)	05	134,619	134,619		134,619	161,713		161,713	U
141	0604756N	Ship Self Defense (Engage: Hard Kill)	05	114,475	114,475		114,475	212,412		212,412	U
142	0604757N	Ship Self Defense (Engage: Soft Kill/EW)	05	114,211	114,211		114,211	103,391		103,391	U
143	0604761N	Intelligence Engineering	05	11,029	13,029		13,029	34,855		34,855	U
144	0604771N	Medical Development	05	9,220	9,221		9,221	9,353		9,353	U
145	0604777N	Navigation/ID System	05	42,723	42,723		42,723	92,546		92,546	U
146	0604800M	Joint Strike Fighter (JSF) - EMD	05	531,426	531,426		531,426	152,934		152,934	U
147	0604800N	Joint Strike Fighter (JSF) - EMD	05	528,716	528,716		528,716	108,931		108,931	U
148	0604810M	Joint Strike Fighter Follow On Modernization (FoM) - Marine Corps	05	74,227	74,227		74,227	144,958		144,958	U
149	0604810N	Joint Strike Fighter Follow On Modernization (FoM) - Navy	05	63,387	63,387		63,387	143,855		143,855	U

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150	0605013M	Information Technology Development	05	3,915	4,856	4,856					U
151	0605013N	Information Technology Development	05	77,895	97,066	97,066					U
152	0605024N	Anti-Tamper Technology Support	05		2,500	2,500					U
153	0605212N	CH-53K RDTE	05	563,174	404,810	404,810					U
154	0605215N	Mission Planning	05		33,570	33,570					U
155	0605217N	Common Avionics	05		51,599	54,599					U
156	0605220N	Ship to Shore Connector (SSC)	05	7,734	11,088	11,088					U
157	0605327N	T-AO 205 Class	05		1,095	1,095					U
158	0605414N	Unmanned Carrier Aviation (UCA)	05		89,000	89,000					U
159	0605450N	Joint Air-to-Ground Missile (JAGM)	05	25,640	17,880	17,880					U
160	0605500N	Multi-mission Maritime Aircraft (MMA)	05	151,472	59,126	59,126					U
161	0605504N	Multi-Mission Maritime (MMA) Increment III	05	89,686	182,220	182,220					U
162	0605611M	Marine Corps Assault Vehicles System Development & Demonstration	05								U
163	0605813M	Joint Light Tactical Vehicle (JLTV) System Development & Demonstration	05								U
164	0204202N	DDG-1000	05	101,724	45,642	45,642					U
165	0303167N	Pre-Auction Spectrum Relocation***	05	131							U
166	0303267N	Auctioned Spectrum Relocation Fund***	05	108,490							U
167	0304231N	Tactical Command System - MIP	05	998	676	676					U

***Funding in this line item 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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150	0605013M	Information Technology Development	05	4,856	4,856		4,856	14,865		14,865	U
151	0605013N	Information Technology Development	05	97,066	97,066		97,066	152,977		152,977	U
152	0605024N	Anti-Tamper Technology Support	05	2,500	2,500		2,500	3,410		3,410	U
153	0605212N	CH-53K RDTE	05	404,810	404,810		404,810	340,758		340,758	U
154	0605215N	Mission Planning	05	33,570	33,570		33,570	33,430		33,430	U
155	0605217N	Common Avionics	05	51,599	54,599		54,599	58,163		58,163	U
156	0605220N	Ship to Shore Connector (SSC)	05	11,088	11,088		11,088	22,410		22,410	U
157	0605327N	T-AO 205 Class	05	1,095	1,095		1,095	1,961		1,961	U
158	0605414N	Unmanned Carrier Aviation (UCA)	05	89,000	89,000		89,000	222,208		222,208	U
159	0605450N	Joint Air-to-Ground Missile (JAGM)	05	17,880	17,880		17,880	15,473		15,473	U
160	0605500N	Multi-mission Maritime Aircraft (MMA)	05	59,126	59,126		59,126	11,795		11,795	U
161	0605504N	Multi-Mission Maritime (MMA) Increment III	05	182,220	182,220		182,220	181,731		181,731	U
162	0605611M	Marine Corps Assault Vehicles System Development & Demonstration	05					178,993		178,993	U
163	0605813M	Joint Light Tactical Vehicle (JLTV) System Development & Demonstration	05					20,710		20,710	U
164	0204202N	DDG-1000	05	45,642	45,642		45,642	140,500		140,500	U
165	0303167N	Pre-Auction Spectrum Relocation***	05								U
166	0303267N	Auctioned Spectrum Relocation Fund***	05								U
167	0304231N	Tactical Command System - MIP	05	676	676		676				U

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168	0304785N	Tactical Cryptologic Systems	05	17,785	36,747	36,747					U
169	0305124N	Special Applications Program	05	26,505	35,002	35,002					U
170	0306250M	Cyber Operations Technology Development	05		4,942	4,942					U
		System Development & Demonstration		6,236,999	6,025,655	6,112,003					
171	0604256N	Threat Simulator Development	06	30,323	16,633	16,633					U
172	0604258N	Target Systems Development	06	58,730	36,662	36,662					U
173	0604759N	Major T&E Investment	06	66,538	42,109	42,109					U
174	0605126N	Joint Theater Air and Missile Defense Organization	06	6,799	2,998	2,998					U
175	0605152N	Studies and Analysis Support - Navy	06	4,141	3,931	3,931					U
176	0605154N	Center for Naval Analyses	06	45,558	46,634	46,634					U
177	0605285N	Next Generation Fighter	06	5,909	1,200	1,200					U
178	0605502N	Small Business Innovative Research	06	384,569							U
179	0605804N	Technical Information Services	06	1,328	903	903					U
180	0605853N	Management, Technical & International Support	06	77,073	87,077	87,077					U
181	0605856N	Strategic Technical Support	06	3,140	3,597	3,597					U
182	0605861N	RDT&E Science and Technology Management	06	76,872	62,811	63,000					U
183	0605863N	RDT&E Ship and Aircraft Support	06	128,715	106,093	106,093					U
184	0605864N	Test and Evaluation Support	06	351,469	349,146	413,446					U

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168	0304785N	Tactical Cryptologic Systems	05	36,747	36,747		36,747	28,311		28,311	U
169	0305124N	Special Applications Program	05	35,002	35,002		35,002				U
170	0306250M	Cyber Operations Technology Development	05	4,942	4,942		4,942	4,502		4,502	U
		System Development & Demonstration		6,025,655	6,112,003		6,112,003	6,362,102		6,362,102	
171	0604256N	Threat Simulator Development	06	16,633	16,633		16,633	91,819		91,819	U
172	0604258N	Target Systems Development	06	36,662	36,662		36,662	23,053		23,053	U
173	0604759N	Major T&E Investment	06	42,109	42,109		42,109	52,634		52,634	U
174	0605126N	Joint Theater Air and Missile Defense Organization	06	2,998	2,998		2,998	141		141	U
175	0605152N	Studies and Analysis Support - Navy	06	3,931	3,931		3,931	3,917		3,917	U
176	0605154N	Center for Naval Analyses	06	46,634	46,634		46,634	50,432		50,432	U
177	0605285N	Next Generation Fighter	06	1,200	1,200		1,200				U
178	0605502N	Small Business Innovative Research	06								U
179	0605804N	Technical Information Services	06	903	903		903	782		782	U
180	0605853N	Management, Technical & International Support	06	87,077	87,077		87,077	94,562		94,562	U
181	0605856N	Strategic Technical Support	06	3,597	3,597		3,597	4,313		4,313	U
182	0605861N	RDT&E Science and Technology Management	06	62,811	63,000		63,000	1,104		1,104	U
183	0605863N	RDT&E Ship and Aircraft Support	06	106,093	106,093		106,093	105,666		105,666	U
184	0605864N	Test and Evaluation Support	06	349,146	413,446		413,446	373,667		373,667	U

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185	0605865N	Operational Test and Evaluation Capability	06	17,796	18,160	18,199					U
186	0605866N	Navy Space and Electronic Warfare (SEW) Support	06	6,316	9,658	9,658					U
187	0605867N	SEW Surveillance/Reconnaissance Support	06	6,519	6,500	6,500					U
188	0605873M	Marine Corps Program Wide Support	06	14,129	22,247	22,247					U
189	0605898N	Management HQ - R&D	06		16,254	16,312					U
190	0606355N	Warfare Innovation Management	06		21,123	21,123					U
191	0902498N	Management Headquarters (Departmental Support Activities)	06								U
192	0909980N	Judgment Fund Reimbursement	06	398							U
193	0909999N	Financing for Cancelled Account Adjustments	06	171							U
194	1206867N	SEW Surveillance/Reconnaissance Support	06								U
		Management Support		1,286,493	853,736	918,322					
196	0607658N	Cooperative Engagement Capability (CEC)	07		84,501	84,501					U
197	0607700N	Deployable Joint Command and Control	07		2,970	2,970					U
198	0101221N	Strategic Sub & Weapons System Support	07	96,078	136,556	136,556					U
199	0101224N	SSBN Security Technology Program	07	45,166	33,845	33,845					U
200	0101226N	Submarine Acoustic Warfare Development	07	4,658	9,329	9,329					U

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185	0605865N	Operational Test and Evaluation Capability	06	18,160	18,199		18,199	20,298		20,298	U
186	0605866N	Navy Space and Electronic Warfare (SEW) Support	06	9,658	9,658		9,658	17,341		17,341	U
187	0605867N	SEW Surveillance/Reconnaissance Support	06	6,500	6,500		6,500				U
188	0605873M	Marine Corps Program Wide Support	06	22,247	22,247		22,247	21,751		21,751	U
189	0605898N	Management HQ - R&D	06	16,254	16,312		16,312	44,279		44,279	U
190	0606355N	Warfare Innovation Management	06	21,123	21,123		21,123	28,841		28,841	U
191	0902498N	Management Headquarters (Departmental Support Activities)	06					1,749		1,749	U
192	0909980N	Judgment Fund Reimbursement	06								U
193	0909999N	Financing for Cancelled Account Adjustments	06								U
194	1206867N	SEW Surveillance/Reconnaissance Support	06					9,408		9,408	U
		Management Support		853,736	918,322		918,322	945,757		945,757	
196	0607658N	Cooperative Engagement Capability (CEC)	07	84,501	84,501		84,501	92,571		92,571	U
197	0607700N	Deployable Joint Command and Control	07	2,970	2,970		2,970	3,137		3,137	U
198	0101221N	Strategic Sub & Weapons System Support	07	136,556	136,556		136,556	135,219		135,219	U
199	0101224N	SSBN Security Technology Program	07	33,845	33,845		33,845	36,242		36,242	U
200	0101226N	Submarine Acoustic Warfare Development	07	9,329	9,329		9,329	12,053		12,053	U

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201	0101402N	Navy Strategic Communications	07	16,121	17,218	17,218					U
202	0203761N	Rapid Technology Transition (RTT)	07	7,626							U
203	0204136N	F/A-18 Squadrons	07	132,905	189,125	189,125					U
204	0204163N	Fleet Telecommunications (Tactical)	07	39,548	48,225	48,225					U
205	0204228N	Surface Support	07	28,210	21,156	21,156					U
206	0204229N	Tomahawk and Tomahawk Mission Planning Center (TMPC)	07	26,650	71,355	91,355					U
207	0204311N	Integrated Surveillance System	07	76,204	58,542	58,542					U
208	0204413N	Amphibious Tactical Support Units (Displacement Craft)	07	11,330	13,929	13,929					U
209	0204460M	Ground/Air Task Oriented Radar (G/ ATOR)	07	61,348	83,538	83,538					U
210	0204571N	Consolidated Training Systems Development	07	32,902	38,593	38,593					U
211	0204574N	Cryptologic Direct Support	07	1,915	1,122	1,122					U
212	0204575N	Electronic Warfare (EW) Readiness Support	07	44,727	99,998	99,998					U
213	0205601N	HARM Improvement	07	28,063	48,635	48,635					U
214	0205604N	Tactical Data Links	07	138,549	124,785	124,785					U
215	0205620N	Surface ASW Combat System Integration	07	23,685	24,583	24,583					U
216	0205632N	MK-48 ADCAP	07	47,496	39,134	39,134					U
217	0205633N	Aviation Improvements	07	103,685	120,861	120,861					U

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201	0101402N	Navy Strategic Communications	07	17,218	17,218		17,218	18,221		18,221	U
202	0203761N	Rapid Technology Transition (RTT)	07								U
203	0204136N	F/A-18 Squadrons	07	189,125	189,125		189,125	224,470		224,470	U
204	0204163N	Fleet Telecommunications (Tactical)	07	48,225	48,225		48,225	33,525		33,525	U
205	0204228N	Surface Support	07	21,156	21,156		21,156	24,829		24,829	U
206	0204229N	Tomahawk and Tomahawk Mission Planning Center (TMPC)	07	71,355	91,355		91,355	133,617		133,617	U
207	0204311N	Integrated Surveillance System	07	58,542	58,542		58,542	38,972	11,600	50,572	U
208	0204413N	Amphibious Tactical Support Units (Displacement Craft)	07	13,929	13,929		13,929	3,940		3,940	U
209	0204460M	Ground/Air Task Oriented Radar (G/ ATOR)	07	83,538	83,538		83,538	54,645		54,645	U
210	0204571N	Consolidated Training Systems Development	07	38,593	38,593		38,593	66,518		66,518	U
211	0204574N	Cryptologic Direct Support	07	1,122	1,122		1,122	1,155	1,200	2,355	U
212	0204575N	Electronic Warfare (EW) Readiness Support	07	99,998	99,998		99,998	51,040		51,040	U
213	0205601N	HARM Improvement	07	48,635	48,635		48,635	87,989		87,989	U
214	0205604N	Tactical Data Links	07	124,785	124,785		124,785	89,852		89,852	U
215	0205620N	Surface ASW Combat System Integration	07	24,583	24,583		24,583	29,351		29,351	U
216	0205632N	MK-48 ADCAP	07	39,134	39,134		39,134	68,553		68,553	U
217	0205633N	Aviation Improvements	07	120,861	120,861		120,861	119,099		119,099	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 2016 Base + OCO	FY 2017 PB Request with CR Adj Base	FY 2017 Total PB Requests* with CR Adj Base	FY 2017 PB Request with CR Adj OCO	FY 2017 Total PB Requests* with CR Adj OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj OCO	Sec
218	0205675N	Operational Nuclear Power Systems	07	101,323	101,786	101,786					U
219	0206313M	Marine Corps Communications Systems	07	84,017	82,159	118,146					U
220	0206335M	Common Aviation Command and Control System (CAC2S)	07	13,959	11,850	11,850					U
221	0206623M	Marine Corps Ground Combat/ Supporting Arms Systems	07	55,058	47,877	51,835					U
222	0206624M	Marine Corps Combat Services Support	07	23,423	13,194	13,194					U
223	0206625M	USMC Intelligence/Electronic Warfare Systems (MIP)	07	13,373	17,171	24,187					U
224	0206629M	Amphibious Assault Vehicle	07	41,363	38,020	38,020					U
225	0207161N	Tactical AIM Missiles	07	59,053	56,285	56,285					U
226	0207163N	Advanced Medium Range Air-to-Air Missile (AMRAAM)	07	30,240	40,350	40,350					U
227	0219902M	Global Combat Support System - Marine Corps (GCSS-MC)	07		9,128	9,128					U
231	0303109N	Satellite Communications (SPACE)	07	45,946	37,372	37,372					U
232	0303138N	Consolidated Afloat Network Enterprise Services (CANES)	07	21,522	23,541	23,541					U
233	0303140N	Information Systems Security Program	07	29,491	38,510	38,510					U
235	0305160N	Navy Meteorological and Ocean Sensors-Space (METOC)	07	599							U
236	0305192N	Military Intelligence Program (MIP) Activities	07	6,207	6,019	6,019					U
237	0305204N	Tactical Unmanned Aerial Vehicles	07	8,550	8,436	8,436					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 2017 Total PB Requests** with CR Adj Base+OCO+SAA	FY 2017 Total PB Requests* with CR Adj Base + OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj Base + OCO	FY 2018 Base	FY 2018 OCO	FY 2018 Total	Sec
218	0205675N	Operational Nuclear Power Systems	07	101,786	101,786		101,786	127,445		127,445	U
219	0206313M	Marine Corps Communications Systems	07	82,159	118,146		118,146	123,825		123,825	U
220	0206335M	Common Aviation Command and Control System (CAC2S)	07	11,850	11,850		11,850	7,343		7,343	U
221	0206623M	Marine Corps Ground Combat/ Supporting Arms Systems	07	47,877	51,835		51,835	66,009		66,009	U
222	0206624M	Marine Corps Combat Services Support	07	13,194	13,194		13,194	25,258		25,258	U
223	0206625M	USMC Intelligence/Electronic Warfare Systems (MIP)	07	17,171	24,187		24,187	30,886		30,886	U
224	0206629M	Amphibious Assault Vehicle	07	38,020	38,020		38,020	58,728		58,728	U
225	0207161N	Tactical AIM Missiles	07	56,285	56,285		56,285	42,884		42,884	U
226	0207163N	Advanced Medium Range Air-to-Air Missile (AMRAAM)	07	40,350	40,350		40,350	25,364		25,364	U
227	0219902M	Global Combat Support System - Marine Corps (GCSS-MC)	07	9,128	9,128		9,128				U
231	0303109N	Satellite Communications (SPACE)	07	37,372	37,372		37,372				U
232	0303138N	Consolidated Afloat Network Enterprise Services (CANES)	07	23,541	23,541		23,541	24,271		24,271	U
233	0303140N	Information Systems Security Program	07	38,510	38,510		38,510	50,269		50,269	U
235	0305160N	Navy Meteorological and Ocean Sensors-Space (METOC)	07								U
236	0305192N	Military Intelligence Program (MIP) Activities	07	6,019	6,019		6,019	6,352		6,352	U
237	0305204N	Tactical Unmanned Aerial Vehicles	07	8,436	8,436		8,436	7,770		7,770	U

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Line No	Program Element Number	Item	Act	FY 2016 Base + OCO	FY 2017 PB Request with CR Adj Base	FY 2017 Total PB Requests* with CR Adj Base	FY 2017 PB Request with CR Adj OCO	FY 2017 Total PB Requests* with CR Adj OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj OCO	Sec
238	0305205N	UAS Integration and Interoperability	07	42,202	36,509	36,509					U
239	0305208M	Distributed Common Ground/Surface Systems	07	1,105	2,100	2,100					U
240	0305208N	Distributed Common Ground/Surface Systems	07	23,149	44,571	44,571					U
241	0305220N	MQ-4C Triton	07	237,118	111,729	111,729					U
242	0305231N	MQ-8 UAV	07	52,770	26,518	26,518					U
243	0305232M	RQ-11 UAV	07	635	418	418					U
244	0305233N	RQ-7 UAV	07	688	716	716					U
245	0305234N	Small (Level 0) Tactical UAS (STUASL0)	07	4,647	5,071	5,071					U
246	0305239M	RQ-21A	07	6,251	9,497	9,497					U
247	0305241N	Multi-Intelligence Sensor Development	07	39,645	77,965	77,965					U
248	0305242M	Unmanned Aerial Systems (UAS) Payloads (MIP)	07	9,246	11,181	11,181					U
249	0305421N	RQ-4 Modernization	07	119,892	181,266	181,266					U
250	0308601N	Modeling and Simulation Support	07	4,585	4,709	4,709					U
251	0702207N	Depot Maintenance (Non-IF)	07	23,401	49,322	49,322					U
252	0708730N	Maritime Technology (MARITECH)	07	4,162	3,204	3,204					U
253	1203109N	Satellite Communications (SPACE)	07								U
9999	9999999999	Classified Programs		1,527,932	1,228,460	1,265,631	36,426	128,626		128,626	U
		Operational Systems Development		3,598,418	3,592,934	3,697,066					

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

Line No	Program Element Number	Item	Act	FY 2017 Total PB Requests** with CR Adj Base+OCO+SAA	FY 2017 Total PB Requests* with CR Adj Base + OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj Base + OCO	FY 2018 Base	FY 2018 OCO	FY 2018 Total	Sec
238	0305205N	UAS Integration and Interoperability	07	36,509	36,509		36,509	39,736		39,736	U
239	0305208M	Distributed Common Ground/Surface Systems	07	2,100	2,100		2,100	12,867		12,867	U
240	0305208N	Distributed Common Ground/Surface Systems	07	44,571	44,571		44,571	46,150		46,150	U
241	0305220N	MQ-4C Triton	07	111,729	111,729		111,729	84,115		84,115	U
242	0305231N	MQ-8 UAV	07	26,518	26,518		26,518	62,656		62,656	U
243	0305232M	RQ-11 UAV	07	418	418		418	2,022		2,022	U
244	0305233N	RQ-7 UAV	07	716	716		716				U
245	0305234N	Small (Level 0) Tactical UAS (STUASL0)	07	5,071	5,071		5,071	4,835		4,835	U
246	0305239M	RQ-21A	07	9,497	9,497		9,497	8,899		8,899	U
247	0305241N	Multi-Intelligence Sensor Development	07	77,965	77,965		77,965	99,020		99,020	U
248	0305242M	Unmanned Aerial Systems (UAS) Payloads (MIP)	07	11,181	11,181		11,181	18,578		18,578	U
249	0305421N	RQ-4 Modernization	07	181,266	181,266		181,266	229,404		229,404	U
250	0308601N	Modeling and Simulation Support	07	4,709	4,709		4,709	5,238		5,238	U
251	0702207N	Depot Maintenance (Non-IF)	07	49,322	49,322		49,322	38,227		38,227	U
252	0708730N	Maritime Technology (MARITECH)	07	3,204	3,204		3,204	4,808		4,808	U
253	1203109N	Satellite Communications (SPACE)	07					37,836		37,836	U
9999	9999999999	Classified Programs		1,264,886	1,394,257		1,394,257	1,364,347	89,855	1,454,202	U
		Operational Systems Development		3,629,360	3,825,692		3,825,692	3,980,140	102,655	4,082,795	

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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 2016 Base + OCO	FY 2017 PB Request with CR Adj Base	FY 2017 Total PB Requests* with CR Adj Base	FY 2017 PB Request with CR Adj OCO	FY 2017 Total PB Requests* with CR Adj OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj OCO	Sec
254	0901560N	Continuing Resolution Programs	20		800,517	800,517	-42,576	-42,576		-42,576	U
		Undistributed			800,517	800,517	-42,576	-42,576		-42,576	
Total Research, Development, Test & Eval, Navy				18,333,041	18,076,818	18,376,384	35,747	163,447		163,447	

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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 2017 Total PB Requests** with CR Adj Base+OCO+SAA	FY 2017 Total PB Requests* with CR Adj Base + OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj Base + OCO	FY 2018 Base	FY 2018 OCO	FY 2018 Total	Sec
254	0901560N	Continuing Resolution Programs	20	757,941	757,941		757,941				U
		Undistributed		757,941	757,941		757,941				
Total Research, Development, Test & Eval, Navy				18,112,565	18,539,831		18,539,831	17,675,035	130,365	17,805,400	

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Non RDT&E Title
(Dollars in Thousands)

Summary Recap of Budget Activities	FY 2016 Base + OCO	FY 2017 PB Request with CR Adj Base	FY 2017 Total PB Requests* with CR Adj Base	FY 2017 PB Request with CR Adj OCO	FY 2017 Total PB Requests* with CR Adj OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj OCO
Research and Development	36,289						
Total Research, Development, Test & Evaluation	36,289						

Summary Recap of Non-RDT&E Title FYDP Programs

Mobility Forces	36,289
Total Research, Development, Test & Evaluation	36,289

Department of the Navy
FY 2018 President's Budget Request
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Non RDT&E Title
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Summary Recap of Budget Activities	FY 2017 Total PB Requests** with CR Adj Base+OCO+SAA	FY 2017 Total PB Requests* with CR Adj Base + OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj Base + OCO	FY 2018 Base	FY 2018 OCO	FY 2018 Total
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
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Non RDT&E Title
(Dollars in Thousands)

Appropriation: 4557N National Defense Sealift Fund

Line No	Program Element Number	Item	Act	FY 2016 Base + OCO	FY 2017 PB Request with CR Adj Base	FY 2017 Total PB Requests* with CR Adj Base	FY 2017 PB Request with CR Adj OCO	FY 2017 Total PB Requests* with CR Adj OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj OCO	Sec
1	0408042N	National Defense Sealift Fund	04	36,289							U
		Research and Development		36,289							
Total National Defense Sealift Fund				36,289							

Department of the Navy
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Non RDT&E Title
(Dollars in Thousands)

Appropriation: 4557N National Defense Sealift Fund

Line No	Program Element Number	Item	Act	FY 2017 Total PB Requests** with CR Adj Base+OCO+SAA	FY 2017 Total PB Requests* with CR Adj Base + OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj Base + OCO	FY 2018 Base	FY 2018 OCO	FY 2018 Total	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	

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Operational Nuclear Power Sys	0205675N	218	07	Volume 5 - 417
Operational Test & Eval Capability	0605865N	185	06	Volume 4 - 237
Other Helicopter Development	0604212N	97	05	Volume 3 - 19
P-3 Modernization Program	0604221N	102	05	Volume 3 - 101
Personnel, Trng, Sim, & Human Factors	0604703N	138	05	Volume 3 - 823
Power Proj Applied Research	0602114N	4	02	Volume 1 - 93

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Power Projection Advanced Technology	0603114N	18	03	Volume 1 - 333
RDT&E Science & Tech Mgmt	0605861N	182	06	Volume 4 - 185
RDT&E Ship & Aircraft Support	0605863N	183	06	Volume 4 - 197
RQ-11 UAV	0305232M	243	07	Volume 5 - 905
RQ-7 UAV	0305233N	244	07	Volume 5 - 911
Radiological Control	0603542N	43	04	Volume 2 - 245
Rapid Technology Capability Prototype	0604320M	85	04	Volume 2 - 839
Rapid Technology Transition (RTT)	0203761N	202	07	Volume 5 - 81
SEW Architecture/Eng Support	0604707N	90	04	Volume 2 - 883
SSBN Security Tech Program	0101224N	199	07	Volume 5 - 47
SSN-688 & Trident Modernization	0604503N	125	05	Volume 3 - 573
Satellite Communications (Space)	0303109N	231	07	Volume 5 - 753
Ship Concept Advanced Design	0603563N	47	04	Volume 2 - 323
Ship Contract Design/ Live Fire T&E	0604567N	132	05	Volume 3 - 733
Ship Prel Design & Feasibility Studies	0603564N	48	04	Volume 2 - 351
Ship Self Def (Detect & Cntrl)	0604755N	140	05	Volume 3 - 845
Ship Self Def (Engage: Hard Kill)	0604756N	141	05	Volume 3 - 889
Ship Self Def (Engage: Soft Kill/EW)	0604757N	142	05	Volume 3 - 923
Shipboard Aviation Systems	0604512N	127	05	Volume 3 - 657

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Small Diameter Bomb (SDB)	0604329N	118	05	Volume 3 - 441
Space & Elec War Surv/Recon	0605867N	187	06	Volume 4 - 253
Standard Missile Improvements	0604366N	119	05	Volume 3 - 459
Standards Development	0604215N	99	05	Volume 3 - 59
Strategic Sub & Wpns Sys Supt	0101221N	198	07	Volume 5 - 25
Strategic Technical Support	0605856N	181	06	Volume 4 - 177
Studies & Analysis Supt - Navy	0605152N	175	06	Volume 4 - 39
Submarine Acoustic War Dev	0101226N	200	07	Volume 5 - 49
Submarine Tactical Warfare Sys	0603562N	46	04	Volume 2 - 315
Submarine Tactical Warfare System	0604562N	131	05	Volume 3 - 717
Surface & Shallow Water MCM	0603502N	37	04	Volume 2 - 155
Surface ASW	0603553N	44	04	Volume 2 - 259
Surface ASW Cmbt Sys Integr	0205620N	215	07	Volume 5 - 347
Surface Combatant Cmbt Sys Eng	0604307N	116	05	Volume 3 - 405
Surface Ship Torpedo Defense	0603506N	38	04	Volume 2 - 215
Surface Support	0204228N	205	07	Volume 5 - 145
Tact Air Dir Infrared CM (TADIRCM)	0604272N	81	04	Volume 2 - 811
Tactical Aim Missiles	0207161N	225	07	Volume 5 - 723

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Tactical Airborne Reconnaissance	0603261N	35	04	Volume 2 - 93
Tactical Command System	0604231N	104	05	Volume 3 - 119
Tactical Command System - MIP	0304231N	167	05	Volume 3 - 1439
Tactical Cryptologic Systems	0304785N	168	05	Volume 3 - 1443
Tactical Data Links	0205604N	214	07	Volume 5 - 305
Tactical Unmanned Aer Vehicles	0305204N	237	07	Volume 5 - 829
Target Systems Development	0604258N	172	06	Volume 4 - 15
Technical Information Services	0605804N	179	06	Volume 4 - 101
Test & Evaluation Support	0605864N	184	06	Volume 4 - 209
Threat Simulator Development	0604256N	171	06	Volume 4 - 1
Tomahawk Mssn Planning Ctr	0204229N	206	07	Volume 5 - 159
Training System Aircraft	0603208N	96	05	Volume 3 - 1
USMC Intelligence/Electronics Warfare Sys	0206625M	223	07	Volume 5 - 671
Undersea Warfare Advanced Tech	0603747N	26	03	Volume 1 - 461
Undersea Warfare Applied Res	0602747N	12	02	Volume 1 - 243
University Research Initiatives	0601103N	1	01	Volume 1 - 1
V-22A	0604262N	108	05	Volume 3 - 245
Warfare Support System	0604230N	103	05	Volume 3 - 105
Warfighter Protection Adv Tech	0603729N	25	03	Volume 1 - 455

Program Element Title	Program Element Number	Line #	BA	Page
Warfighter Sustainment Applied Res	0602236N	8	02	Volume 1 - 179

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603207N *I Air/Ocean Tactical Applications*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	537.444	37.126	48.536	48.365	-	48.365	49.741	49.721	50.822	51.868	Continuing	Continuing
2341: *METOC Data Acquisition*	164.046	3.733	4.437	5.483	-	5.483	5.283	5.300	5.405	5.513	Continuing	Continuing
2342: *METOC Data Assimilation and Mod*	214.950	16.174	20.165	21.111	-	21.111	21.407	21.734	22.211	22.676	Continuing	Continuing
2343: *Tactical METOC Applications*	144.390	9.059	13.473	11.715	-	11.715	12.844	13.993	14.304	14.614	Continuing	Continuing
2344.: *Precise Time and Astrometry*	8.600	4.797	5.636	5.190	-	5.190	4.705	3.072	3.127	3.132	Continuing	Continuing
2363.: *Remote Sensing Capability Development*	4.949	2.406	3.855	3.959	-	3.959	3.990	4.033	4.109	4.189	Continuing	Continuing
3207: *Fleet Synthetic Training*	0.509	0.957	0.970	0.253	-	0.253	0.274	0.294	0.315	0.336	Continuing	Continuing
3404: *Tactical Environmental Support*	0.000	0.000	0.000	0.327	-	0.327	0.619	0.648	0.675	0.704	Continuing	Continuing
3405: *Decision Support Products & Dissemination*	0.000	0.000	0.000	0.327	-	0.327	0.619	0.647	0.676	0.704	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Air Ocean 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: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	37.832	48.536	49.686	-	49.686
Current President's Budget	37.126	48.536	48.365	-	48.365
Total Adjustments	-0.706	0.000	-1.321	-	-1.321
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.706	0.000			
• Program Adjustments	0.000	0.000	-2.932	-	-2.932
• Rate/Misc Adjustments	0.000	0.000	1.611	-	1.611

Change Summary Explanation

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

2) The schedule for NITES-Next is updated to reflect a 12 month delay to Fleet Capability Release-3 (FCR-3) Build Decision.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603207N / *Air/Ocean Tactical Applications*	Project (Number/Name) 2341 / *METOC Data Acquisition*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2341: *METOC Data Acquisition*	164.046	3.733	4.437	5.483	-	5.483	5.283	5.300	5.405	5.513	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Meteorological and Oceanographic (METOC) Future Mission Capabilities (FMC)	3.433	4.230	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: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2341 / *METOC Data Acquisition*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
FY18 funding realigned to sub project METOC Data Acquisition, project 3404 (Tactical Environmental Support), and project 3405 (Decision Support Products & Dissemination). ***FY 2016 Accomplishments:*** Continued advanced component and prototype development efforts associated with acquiring environmental data. Develop advanced techniques for data measurement and survey techniques that capture measurement uncertainties in order to provide warfare commanders with an accurate assessment of uncertainty in sensor performance prediction products and services. Continued to develop technologies to characterize undersea and atmospheric environment in the battlespace. Continued to develop and demonstrate in-situ sampling techniques to support adaptive and advance measurement technologies. Continued to develop tools and techniques to support forecaster's processing, analysis and performance assessment processes. Developed tools to assess reach-back and on scene data fusion to support improved METOC decision support infrastructure. ***FY 2017 Plans:*** Developed and demonstrated in-situ sampling techniques to support adaptive and advance measurement technologies. Developed techniques to improve delivery of GI&S within Navy METOC product production centers and throughout the fleet user base. Continue development of METOC systems engineering plans, requirements, standards, studies, and other documentation supporting integration of these products. Develop advanced techniques for data measurement and survey techniques that capture measurement uncertainties in order to provide warfare commanders with an accurate assessment of uncertainty in sensor performance prediction products and services. Develop tools to assess reach-back and on scene data fusion to support improved METOC decision support infrastructure. ***FY 2018 Base Plans:*** FY18 funding realigned to sub project METOC Data Acquisition, project 3404 (Tactical Environmental Support), and project 3405 (Decision Support Products & Dissemination). ***FY 2018 OCO Plans:*** N/A					
Title: Tactical Oceanography Capabilities (TOC) / Undersea Warfare (USW)	0.300	0.207	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,					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2341 / *METOC Data Acquisition*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
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. FY18 funding realigned to sub project METOC Data Acquisition, project 3404 (Tactical Environmental Support), and project 3405 (Decision Support Products & Dissemination). ***FY 2016 Accomplishments:*** Continued to transition models, algorithms and databases used to calculate accurate acoustic TL and characterize environmental parameters that affect TL into U.S. Navy ASW TDAs. Continued to develop capabilities to rapidly calculate acoustic TL values within tactical timeframes to include environmental uncertainty quantification of those values for both active and passive sonar systems with emphasis on developing an active radial province capability. ***FY 2017 Plans:*** Continued to transition models, algorithms and databases that calculate accurate acoustic transmission loss (TL) and characterize environmental parameters that affect TL. Developed TL calculation implementations to be used in the Navy's Anti-Submarine Warfare (ASW) Tactical Decision Aids (TDAs) and sonar trainers. Developed capabilities to rapidly calculate acoustic TL values within tactical timeframes to include environmental uncertainty quantification of those values for both active and passive sonar systems with emphasis on developing an active radial province capability. ***FY 2018 Base Plans:*** FY18 funding realigned to sub project METOC Data Acquisition, project 3404 (Tactical Environmental Support), and project 3405 (Decision Support Products & Dissemination). ***FY 2018 OCO Plans:*** N/A					
Title: Meteorological and Oceanographic (METOC) Data Acquisition ***Articles:*** ***Description:*** Data Acquisition provides 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 evolve focusing on the littoral and deep-strike (inland) battlespace. These operating areas (and the transitions between them) have dynamic and complex environmental characteristics and behaviors that require modifying METOC Collections and associated sensing	0.000 -	0.000 -	5.483 -	0.000 -	5.483 -

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2341 / *METOC Data Acquisition*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
strategies and methodologies. Without reliable characterization of ocean and atmosphere, the Navy risks ineffective allocation and employment of warfighters and weapon systems, and the sensors that fully enable them. 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. FY18 funding realigned to project 2341 METOC Data Acquisition from project 2341 Meteorological and Oceanographic (METOC) Future Mission Capabilities (FMC) and Tactical Oceanography Capabilities (TOC)/ Undersea Warfare (USW) and PE 0604218N (Air/Ocean Equipment Engineering) project 2345. This is not a new Start ***FY 2016 Accomplishments:*** N/A ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** Continue Meteorological and Oceanographic (METOC) Future Mission Capabilities (FMC) (METOC FMC) data acquisition efforts to develop and demonstration of in-situ sampling techniques to support adaptive and advance measurement technologies. Continue development efforts to improve delivery of Geospatial Information and Services (GI&S) within Navy METOC product production centers and throughout the fleet user base. Continue development of METOC systems engineering plans, requirements, standards, studies, and other documentation supporting integration of these products. Continue work on advanced techniques for data measurement and survey techniques that capture measurement uncertainties in order to provide warfare commanders with an accurate assessment of uncertainty in sensor performance prediction products and services and development of tools to assess reach-back and on scene data fusion to support improved METOC decision support infrastructure. Continue Tactical Oceanography Capabilities (TOC)/Undersea Warfare (USW) (TOC/USW) data acquisition efforts to transition models, algorithms and databases that calculate accurate acoustic transmission loss (TL)					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2341 / *METOC Data Acquisition*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
and characterize environmental parameters that affect TL. Continue TL calculation implementations to be used in the Navy's Anti-Submarine Warfare (ASW) Tactical Decision Aids (TDAs) and sonar trainers. Continue capabilities to rapidly calculate acoustic TL values within tactical timeframes to include environmental uncertainty quantification of those values for both active and passive sonar systems with emphasis on developing an active radial province capability. Continue system development and demonstration of METOC manned, unmanned and automated sensors (to include integration of environmental sensors into a larger environmental sensing strategy). Continue the development of advanced sensor system support technologies and techniques for sensor deployment, data processing and analysis to include performance metrics to optimize sensor performance. Assess viability of sensors and subsystem sensors on unmanned and manned aircraft systems and autonomous undersea systems for collection of automated METOC data. Continue the development infrastructure to acquire, process and distribute METOC data and products. Assess improved sensor capabilities for unmanned and manned aircraft systems and autonomous undersea systems. Initiate work on acoustic transmission loss characterization using in-situ sensors; conduct research to better characterize acoustic bottom loss; conduct calibration/validation work for new sensors to include space based sensors; conduct work to better characterize ocean ice characteristics using satellite imagery; seek out, characterize, and determine suitability of new sources of data for assimilation into atmospheric and oceanic models. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	3.733	4.437	5.483	0.000	5.483

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• RDTEN/0604218N/2345: *FLEET METOC EQUIPMENT*	3.379	2.222	2.411	-	2.411	2.438	2.456	2.505	0.000	Continuing	Continuing
• RDTEN/0603207N/2342: *METOC DATA ASSIMILATION AND MOD*	8.168	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2341 / *METOC Data Acquisition*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• RDTEN/0604218N/2346: *METOC SENSOR ENGINEERING*	1.136	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

Remarks

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 6.2 - 6.3 S&T work. Metric -- Tasks will address no less than 75% of applicable capability gaps and requirements.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603207N / *Air/Ocean Tactical Applications*	Project (Number/Name) 2342 / *METOC Data Assimilation and Mod*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2342: *METOC Data Assimilation and Mod*	214.950	16.174	20.165	21.111	-	21.111	21.407	21.734	22.211	22.676	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Meteorological and Oceanographic (METOC) Data Assimilation Project is a multi-faceted project that provides future mission capabilities for warfighters to characterize the physical environment within their battlespace. This project includes: 1) development, demonstration and validation of software associated with atmospheric and oceanographic data assimilation forecast models and database management systems for use in both mainframe and tactical scale computers; 2) software models,focused on ocean thermal structure and circulation, and surf and tide prediction; 3) software to process and manage satellite remotely-sensed environmental data at Oceanography Centers ashore and on ships equipped with the AN/SMQ-11 satellite receiver/recorder; 4) future METOC and environmental satellite data readiness and risk reduction preparations to develop hardware and software that will allow ground stations to receive, ingest and exploit satellite data, and, 5) a family of acoustic system performance models beginning with active system models and databases in the low-, mid-, and high-frequency regimes and culminating with high fidelity simulation products.

As weapons and sensors become more sophisticated and complex, the marine environment has an increasingly significant impact on system performance. Operational limitations induced by the ocean and atmosphere must be understood, and the resulting constraints on mission effectiveness and system employment minimized. Hence, the operating forces require more accurate worldwide forecasts of METOC conditions with increased temporal and spatial resolution. An additional challenge is posed by the emergence of new satellite sensor data. In order to fully exploit this dynamic and massive volume of data, modern Data Base Management Systems are required, and must be tailored for individual computer configurations at both Navy Fleet Numerical Meteorology and Oceanography Center (FNMOC), Monterey, CA and Naval Oceanographic Office (NAVO), Stennis Space Center, MS. Improved representation of smaller-scale phenomena, particularly in the littoral, is also an important consideration.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Meteorological and Oceanographic (METOC) Future Mission Capabilities (FMC)	3.809	4.408	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: FY18 funding from project 2342 sub project Meteorological and Oceanographic (METOC) Future Mission Capabilities (FMC) realigned to PE 0603207N project 2342 METOC Data Assimilation and Mod, sub project Battlespace Data Assimilation and Prediction.					
FY 2016 Accomplishments:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Continued development of advanced METOC prediction systems and architectures to provide improved forecasts and estimates of product accuracies. Continue development of improved data fusion and assimilation techniques, data quality control technologies and accelerate the automation of prediction processes using data from tactical sensors, remote sensing and undersea sensor systems. Continued to develop METOC fusion algorithms and demonstrate capabilities. Continue to develop METOC Decision Support & Prediction Tools to improve EM/EO system performance. Accelerated the development of the higher resolution global and small scale ocean forecasting systems with 4 dimensional variational data assimilation. Developed and demonstrate a tropospheric environmental modeling capability to support long range EM propagation ***FY 2017 Plans:*** Development of advanced METOC prediction systems and architectures to provide improved forecasts and estimates of product accuracies. Continue development of improved data fusion and assimilation techniques, data quality control technologies and accelerate the automation of prediction processes using data from tactical sensors, remote sensing and undersea sensor systems. Develop METOC and GI&S fusion algorithms and demonstrate capabilities. Develop METOC Decision Support & Prediction Tools to improve Electromagnetic and Electro-optical (EM/EO) systems performance. Accelerate the development of the higher resolution global and small scale ocean forecasting systems with four-dimensional variation (4DVAR) data assimilation. ***FY 2018 Base Plans:*** FY18 funding from project 2342 sub project Meteorological and Oceanographic (METOC) Future Mission Capabilities (FMC) realigned to PE 0603207N project 2342 METOC Data Assimilation and Mod, sub project Battlespace Data Assimilation and Prediction. ***FY 2018 OCO Plans:*** N/A					
Title: Meteorological and Oceanographic (METOC) Space-Based Sensing Capabilities	2.215	3.544	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: FY18 funding from project 2342 sub project Meteorological and Oceanographic (METOC) Space-Base Sensing Capabilities realigned to PE 0603207N project 2342 METOC Data Assimilation and Mod, sub project Battlespace Data Assimilation and Prediction. ***FY 2016 Accomplishments:*** Preparation to ingest data from earth observing satellite systems, Geostationary Operational Environmental Satellite R-Series (GOES-R), and Global Change Observation Mission (GCOM) W-2 sensors. Begin research					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
and development of data processing and data assimilation algorithms for the Joint Polar Satellite System-1 (JPSS-1), GOES-S, Earthcare, and OceanSat-3 launches scheduled in FY2017. ***FY 2017 Plans:*** Continue performance assessment on National Polar-orbiting Operational Environmental Satellite System Preparatory Project (NPP) and Defense Meteorological Satellite Program (DMSP) satellite sensor suites. Furthering assessment of planned Joint Polar Satellite System (JPSS) sensors and assessment of other national, commercial, and foreign earth observing satellite system's sensor data for use in Navy Atmospheric and Oceanographic Prediction Models. Develop performance assessment of planned national earth observing satellite system's sensor data Sentinel 3a and 3b launch for use in Navy Atmospheric and Oceanographic Prediction Models. Develop assessment of planned environmental satellite sensor launches such as Geostationary Operational Environmental Satellite R-Series (GOES-R) and Global Change Observation Mission (GCOM) W-2 scheduled in FY16. ***FY 2018 Base Plans:*** FY18 funding from project 2342 sub project Meteorological and Oceanographic (METOC) Space-Base Sensing Capabilities realigned to PE 0603207N project 2342 METOC Data Assimilation and Mod, sub project Battlespace Data Assimilation and Prediction. ***FY 2018 OCO Plans:*** N/A					
Title: Tactical Oceanographic Capabilities (TOC) / Undersea Warfare (USW)	1.955	2.393	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 2016 Accomplishments:*** Continue to develop the underlying acoustic and environmental software components of Navy decision tools that assist Undersea Warfare (USW) warfighters to optimally deploy assets equipped with acoustic sensors and to take advantage of prevailing environmental conditions. Verify, validate and transition this software technology through the Oceanographic and Atmospheric Master Library (OAML). Continue population/upgrade of oceanographic, acoustic and geoacoustic databases in COCOM areas of interest. Complete development of Maritime Patrol & Reconnaissance Aircraft (MPRA) and submarine-based Through-the-Sensor (TTS)					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
technologies to collect and transmit environmental data for use by Naval Oceanographic Office (NAVOCEANO) to predict Anti-Submarine Warfare (ASW) sensor performance. Transition, to include Reachback Cells (RBCs), software algorithms that capture and communicate variability and uncertainty contained in the output of underlying model and data base components of ASW Tactical Decision Aids (TDAs). Restart efforts to increase access speed of acoustic surface scattering and loss modules for ASW applications. Continue to develop and transition the environmental software components of Mine Warfare (MIW) TDAs in use by the U.S. Navy's MIW Forces and Naval Oceanography enterprise (NOe) personnel supporting them. Complete development and transition of a global observing database designed through the Ocean Observing System to characterize national and international ocean observatory locations, sensor grid capabilities and mitigations to address potential U.S. submarine security vulnerabilities.					
FY 2017 Plans: - Furthering to develop the underlying acoustic and environmental software components of Navy decision tools that assist Undersea Warfare (USW) warfighters to optimally deploy assets equipped with acoustic sensors and to take advantage of prevailing environmental conditions. Verified, validated and transitioned this software technology through the Oceanographic and Atmospheric Master Library (OAML). - Furthering to refine and validate USW-related performance surface and decision support software applications for use afloat and at ASW RBCs to determine appropriate tactical Courses of Action (COAs) in ASW. - Furthering population/upgrade of oceanographic, acoustic and geo-acoustic databases in COCOM areas of interest. Began developing Maritime Patrol & Reconnaissance Aircraft (MPRA) and submarine-based Through-the-Sensor (TTS) technologies to collect and transmit environmental data for use by Naval Oceanographic Office (NAVOCEANO) to predict Anti- Submarine Warfare (ASW) sensor performance. - Transition software algorithms that capture and communicate variability and uncertainty contained in the output of underlying model and database components of ASW Tactical Decision Aids (TDAs). - Expand capabilities and increased access speed of acoustic surface scattering and loss modules. - Furthering development of software-based methodologies that characterize and forecast bio-acoustic volume attenuation and scatter functions as observed by the Navy's active hull-mounted sonar systems. - Furthering to develop and transition the environmental software components of Mine Warfare (MIW) TDAs in use by the U.S. Navy's MIW Forces and Naval Oceanography enterprise (NOe) personnel supporting them. Provided technical support to the NAVOCEANO in updating geo-acoustic bottom loss & scatter data bases for sonar performance predictions. Began to design, develop, demonstrate and transition a geospatially-enabled global ocean observing system database through the Ocean Observing System (OOS) designed to characterize					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
national and international ocean observatories locations, sensor grid capabilities and mitigations to address potential U.S. submarine security vulnerabilities. - Conduct proof-of-concept at-sea demonstrations of emerging Unmanned Undersea Vehicle (UUV) and Unmanned Surface Vehicle (USV) technologies designed to collect environmental data. - Restart efforts to increase access speed of acoustic surface scattering and loss modules for ASW applications. Continue to develop and transition the environmental software components of Mine Warfare (MIW) TDAs in use by the U.S. Navy's MIW Forces and Naval Oceanography enterprise (NOe) personnel supporting them. Conduct additional proof-of-concept at-sea demonstrations of emerging Unmanned Undersea Vehicle (UUV) and Unmanned Surface Vehicle (USV) technologies designed to collect environmental data based on feedback received on FY14 at-sea demonstration results. ***FY 2018 Base Plans:*** 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 OCO Plans:*** N/A					
Title: Battlespace Data Assimilation and Prediction ***Articles:*** ***Description:*** The Battlespace Data Assimilation and Prediction effort focuses on improvements and adaptions of current models, whereas the ESPC effort is focused on the next suite of models. Battlespace Data Assimilation and Prediction (Processing) related efforts predict the physical environment in support of Navy METOC and all Navy missions. 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 ***FY 2016 Accomplishments:***	0.000 -	0.000 -	10.389 -	0.000 -	10.389 -

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** Battlespace Data Assimilation and Prediction (Processing) - Continue development of Ocean Observing Systems (OOS) Performance Prediction and Mitigation. Initiate upgrade of the Navy Standard Parabolic Equation Model 6.0/6.1. Initiate development of the Coupled Ocean/Atmosphere Mesoscale Prediction System (COAMPS) TC Ensemble. Initiate development of the Assimilation of Sensor-diagnosed, Effective Modified Refractive Indices (ASDEMRI) modified atmospheric refractive index model in support of EMW. Initiate development of National Unified Operational Prediction Capability (NUOPC). Initiate the development of the Navy Aerosol Analysis and Prediction System (NAAPS). Initiate the development of small scale atmospheric models while constructing Tropical Cyclone forecast aids. Conduct development of advanced METOC prediction systems and architectures that provide improved forecasts and estimates of product accuracies thru improved data fusion and assimilation techniques, data quality and control technologies. Continue work on METOC Decision Support & Prediction Tools to improve EM/EO system performance. Provided technical support to the Naval Oceanographic Office (NAVOCEANO) in updating geo-acoustic bottom loss & scatter data bases for sonar performance predictions. Began to design, develop, demonstrate and transition a geospatially-enabled global ocean observing system database through the Ocean Observing System (OOS) designed to characterize national and international ocean observatories locations, sensor grid capabilities and mitigations to address potential U.S. submarine security vulnerabilities. Continue efforts to increase access speed of acoustic surface scattering and loss modules for ASW applications. Continue to develop and transition the environmental software components of Mine Warfare (MIW) TDAs in use by the U.S. Navy's MIW Forces and Naval Oceanography enterprise (NOe) personnel supporting them. Conduct additional proof-of-concept at-sea demonstrations of emerging Unmanned Undersea Vehicle (UUV) and Unmanned Surface Vehicle (USV) technologies designed to collect environmental data based on feedback received on FY14 at-sea demonstration results. ***FY 2018 OCO Plans:*** N/A					
Title: Chief of Naval Operations Speed to Fleet Initiative	0.000	1.058	0.000	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
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). ***FY 2016 Accomplishments:*** N/A ***FY 2017 Plans:*** Initiate and complete an effort to quickly transition new Advanced Propagation Model (APM) capability to the U.S. Fleet. ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A					
Title: Earth System Prediction Capability (ESPC)	8.195	8.762	10.722	0.000	10.722
Articles:	-	-	-	-	-
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. Funding increase from FY 2017 to FY 2018 due to a increased investment in forecast projections for land, sea, ice and middle atmosphere modeling. ***FY 2016 Accomplishments:***					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Initiated high resolution and high fidelity Regional Arctic Prediction System development for improved decision support to maritime operations for 0-7 days as well as monthly and seasonal outlooks. - Initiated improvements to automated ship routing guidance for safety and energy efficiency at 0-7 day lead times. - Continued science workshops and benchmark testing. - Continued efforts towards advanced skillful environmental forecasts and decision guidance (relative to averaged climatology) to improve from the operational capability, currently 7-10 days, to 30 days and longer. - Continued the Navy component to the National R&D initiative for Environmental Prediction across the major U.S. National Operational Prediction Centers at Navy, NOAA, NASA, NSF and DOE. - Continued improved scalability and computational performance of a fully coupled global atmosphere / wave / ocean / land / sea ice prediction system providing daily predictions out to 16 days and weekly predictions out to 30-90 days. - Continued improved DoD decision support for 30-180 Day lead times. - Completed development of a greatly more efficient computational architecture to allow for real-time operational prediction.					
FY 2017 Plans: - Continue all efforts from FY2016, less those noted as complete. - Initiate an Ensemble by design coupled global ocean-atmospheric system for probabilities and risk assessments at longer lead times based on the Navy ESPC deterministic architecture. - Initiate advanced improvements to automated ship routing guidance for safety and energy efficiency from a 7 day maximum to a 14 day maximum lead time. - Continue science workshops and benchmark testing. - Continue efforts towards advanced skillful environmental forecasts and decision guidance (relative to averaged climatology) to improve from the operational capability, currently 7-10 days, to 45 days and longer. - Continue to develop the Navy component to the National R&D initiative for Environmental Prediction across the major U.S. National Operational Prediction Centers at Navy, NOAA, NASA, NSF and DOE. - Continue improved scalability and computational performance of a fully coupled global atmosphere / wave / ocean / land /sea ice prediction system providing daily predictions out to 16 days and weekly predictions out to 30-90 days. - Continue improved DoD decision support for 30-180 Day lead times. - Continue high resolution and high fidelity Regional Arctic Prediction System development for improved decision support to maritime operations for 0-7 days as well as monthly and seasonal outlooks.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Complete initial prototype system, with data cycling and post-model processing for pre-operations evaluation. ***FY 2018 Base Plans:*** Continue all efforts from FY2017, less those noted as complete. Continue an Ensemble by design coupled global ocean-atmospheric system for probabilities and risk assessments at longer lead times based on the Navy ESPC deterministic architecture. Empathizing advanced skillful environmental forecasts and decision guidance (relative to averaged climatology) to improve from the operational capability, currently 7-10 days, to 45 days and longer. Conduct high resolution and high fidelity Regional Arctic Prediction System development for improved decision support to maritime operations for 0-7 days as well as monthly and seasonal outlooks. Initiate a 7 year reanalysis and reforecast project as well as land, sea, ice and middle atmosphere modeling improvements. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	16.174	20.165	21.111	0.000	21.111

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• RDTEN/0604218N/2345: *FLEET METOC EQUIPMENT*	3.379	0.354	0.491	-	0.491	0.480	0.458	0.467	0.000	Continuing	Continuing
• RDTEN/0603207N/2341: *METOC DATA ACQUISITION*	3.763	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• RDTEN/0604218N/2346: *METOC SENSOR ENGINEERING*	1.136	0.000	0.000	-	0.000	9.933	0.000	0.000	0.000	Continuing	Continuing
• RDTEN/0305160N/0524: *NAVY METOC SUPPORT (SPACE)*	0.599	0.000	0.000	-	0.000	0.000	0.000	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.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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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.
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: FY 2018 Navy			Date: May 2017
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
METOC Future Mission Capabilities	WR	NRL : Washington DC	121.405	2.926	Nov 2015	3.626	Nov 2016	0.845	Nov 2017	-		0.845	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	12.269	2.278	Nov 2015	2.545	Nov 2016	0.000		-		0.000	Continuing	Continuing	Continuing
Tactical Oceanography Capabilities / Undersea Warfare	WR	NRL : Washington, DC	7.817	0.523	Nov 2015	1.140	Nov 2016	0.000		-		0.000	Continuing	Continuing	Continuing
Tactical Oceanography Capabilities / Undersea Warfare	C/FP	University of Texas : TX	1.008	0.155	Apr 2016	0.000		0.100	Nov 2017	-		0.100	0.000	1.263	-
Tactical Oceanography Capabilities / Undersea Warfare	WR	NSWC Carderock : West Bethesda, MD	1.640	0.000		0.450	Nov 2016	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	0.680	0.050	Dec 2015	0.120	Dec 2016	0.000		-		0.000	Continuing	Continuing	Continuing
Tactical Oceanography Capabilities / Undersea Warfare	C/FP	Johns Hopkins University : MD	0.310	0.030	Dec 2015	0.091	Dec 2016	0.000		-		0.000	Continuing	Continuing	Continuing
Tactical Oceanography Capabilities / Undersea Warfare	C/FP	SAIC/QNA : Various	1.605	0.000		0.354	Nov 2016	0.000		-		0.000	Continuing	Continuing	Continuing
METOC Future Mission Capabilities	C/FP	SAIC/QNA : Various	1.724	0.758	Jan 2016	0.614	Dec 2016	0.000		-		0.000	Continuing	Continuing	Continuing
Tactical Oceanography Capabilities / Undersea Warfare	C/FP	Penn Sate University : Pennsylvania	0.050	0.075	Dec 2015	0.000		0.000		-		0.000	0.000	0.125	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Tactical Oceanography Capabilities / Undersea Warfare	WR	SSC LANT : North Charleston	0.025	0.025	Nov 2015	0.000		0.000		-		0.000	0.000	0.050	-
Tactical Oceanography Capabilities / Undersea Warfare	C/FP	SPA : Virginia	0.175	0.200	Dec 2015	0.000		0.000		-		0.000	0.000	0.375	-
METOC SUPPORT SPACE-SOFTWARE DEVELOPMENT	WR	NRL : WASHINGTON DC	0.000	0.000		0.515	Nov 2016	0.000		-		0.000	Continuing	Continuing	Continuing
Tactical Oceanography Capabilities / Undersea Warfare	C/FP	METRON : Virginia	0.000	0.385	Dec 2015	0.000		0.000		-		0.000	0.000	0.385	-
Tactical Oceanography Capabilities / Undersea Warfare	C/FP	Vencore : Virginia	0.000	0.239	Nov 2015	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		0.000		8.924	Nov 2017	-		8.924	0.000	8.924	-
Earth Systems Prediction Capability (ONR)	WR	NRL : Washington DC	10.883	5.000	Oct 2015	7.431	Nov 2016	8.847	Nov 2017	-		8.847	Continuing	Continuing	Continuing
ESPC	Various	Various : Various	3.314	2.692	Oct 2015	1.661	Nov 2016	0.681	Nov 2017	-		0.681	Continuing	Continuing	Continuing
CHIEF OF NAVAL OPERATIONS SPEED TO FLEET INITIATIVE	WR	NRL : WASHINGTON DC	0.000	0.000		0.850	Nov 2016	0.000		-		0.000	1.130	1.980	-
		Subtotal	209.522	15.336		19.397		19.397		-		19.397	-	-	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 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: FY 2018 Navy		Date: May 2017
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Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 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	0.461	0.173	Feb 2016	0.000		0.000		-		0.000	0.000	0.634	-
METOC Future Mission Capabilities	C/FP	SAIC : VIRGINIA	0.000	0.000		0.115	Nov 2016	0.100	Nov 2017	-		0.100	Continuing	Continuing	Continuing
METOC SUPPORT SPACE-PROGRAM SUPPORT	WR	SSC PACIFIC : SAN DIEGO, CA	0.000	0.000		0.090	Nov 2016	0.100	Nov 2017	-		0.100	Continuing	Continuing	Continuing
Earth System Modeling Framework - Common Software Architecture	Various	Various : Boulder, CO; Various	0.000	0.000		0.000		0.660	Nov 2017	-		0.660	0.000	0.660	-
Program Support and Subject Matter Expertise	Various	UW-APL : Seattle, WA	1.250	0.313	Oct 2015	0.000		0.358	Nov 2017	-		0.358	Continuing	Continuing	Continuing
		Subtotal	2.979	0.486		0.205		1.218		-		1.218	-	-	-

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 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		0.000		0.234	Nov 2017	-		0.234	0.000	0.234	-
		Subtotal	0.000	0.000		0.000		0.234		-		0.234	0.000	0.234	-

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 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: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 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	0.981	0.164	Nov 2015	0.171	Nov 2016	0.000		-		0.000	Continuing	Continuing	Continuing
METOC Future Mission Capabilities	C/FP	PSS/BAH : San Diego, CA	0.028	0.188	Dec 2015	0.000		0.000		-		0.000	0.000	0.216	-
METOC Space-Based Sensing Capabilities	C/FP	BAH : VIRGINIA	0.000	0.000		0.142	Nov 2016	0.100	Nov 2017	-		0.100	Continuing	Continuing	Continuing
METOC Space-Based Sensing Capabilities	WR	SSC PAC : SAN DIEGO, CA	0.000	0.000		0.213	Nov 2016	0.100	Nov 2017	-		0.100	Continuing	Continuing	Continuing
METOC Acquisition Management	C/CPFF	PSS/BAH : SAN DIEGO, CA	0.000	0.000		0.037	Nov 2016	0.062	Nov 2017	-		0.062	Continuing	Continuing	Continuing
		Subtotal	2.449	0.352		0.563		0.262		-		0.262	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	214.950	16.174		20.165		21.111		-		21.111	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

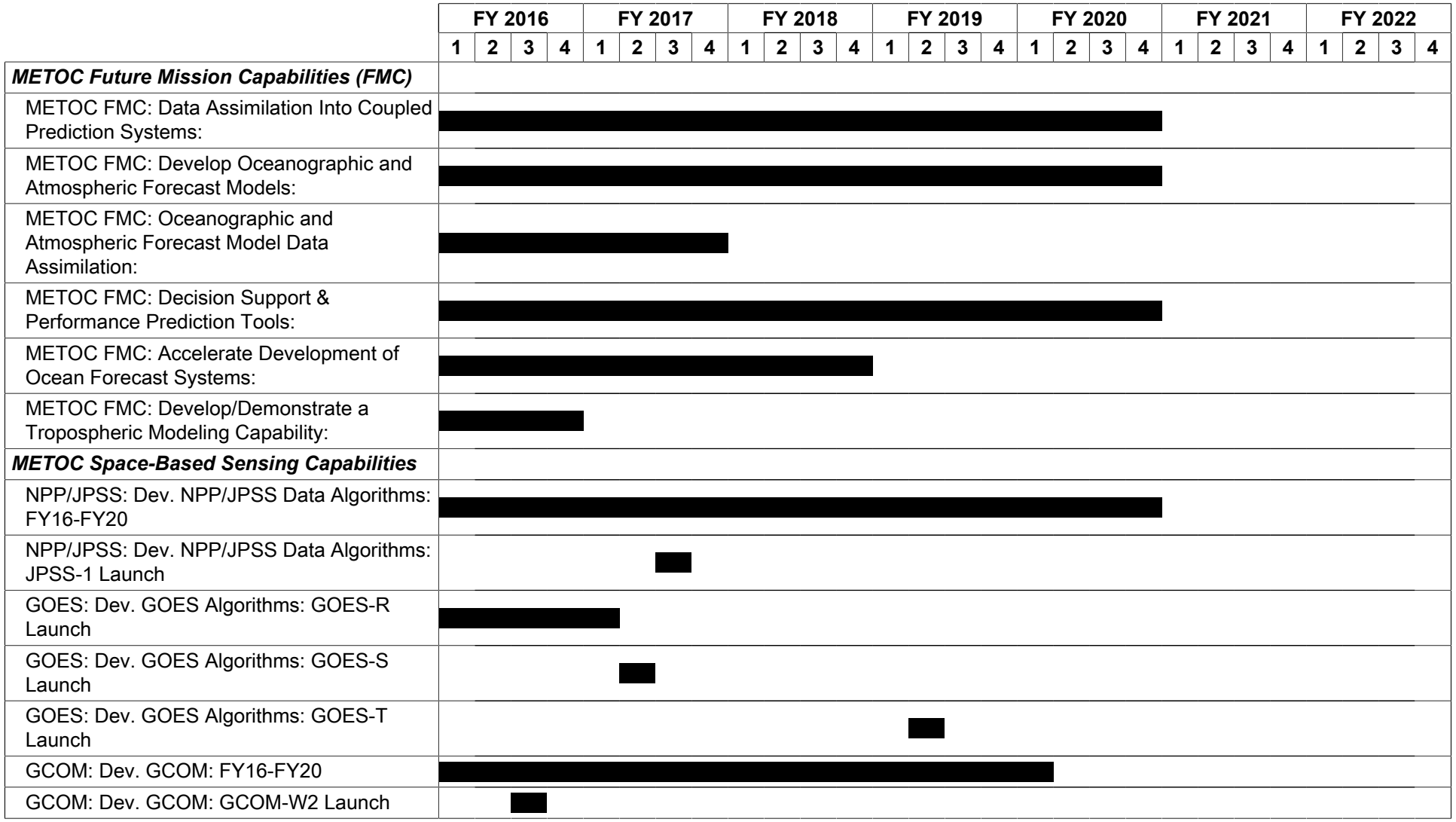


Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

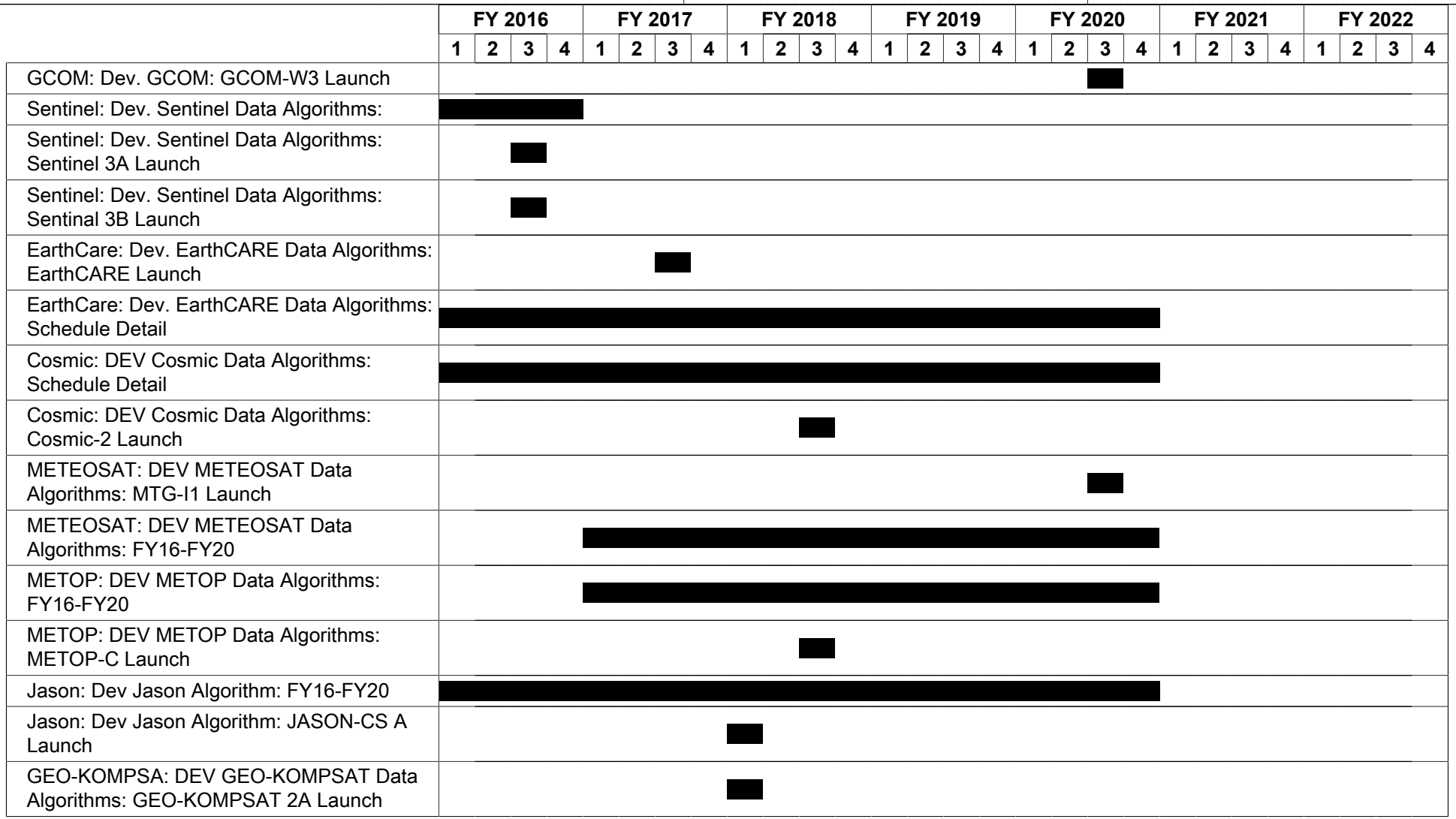


Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

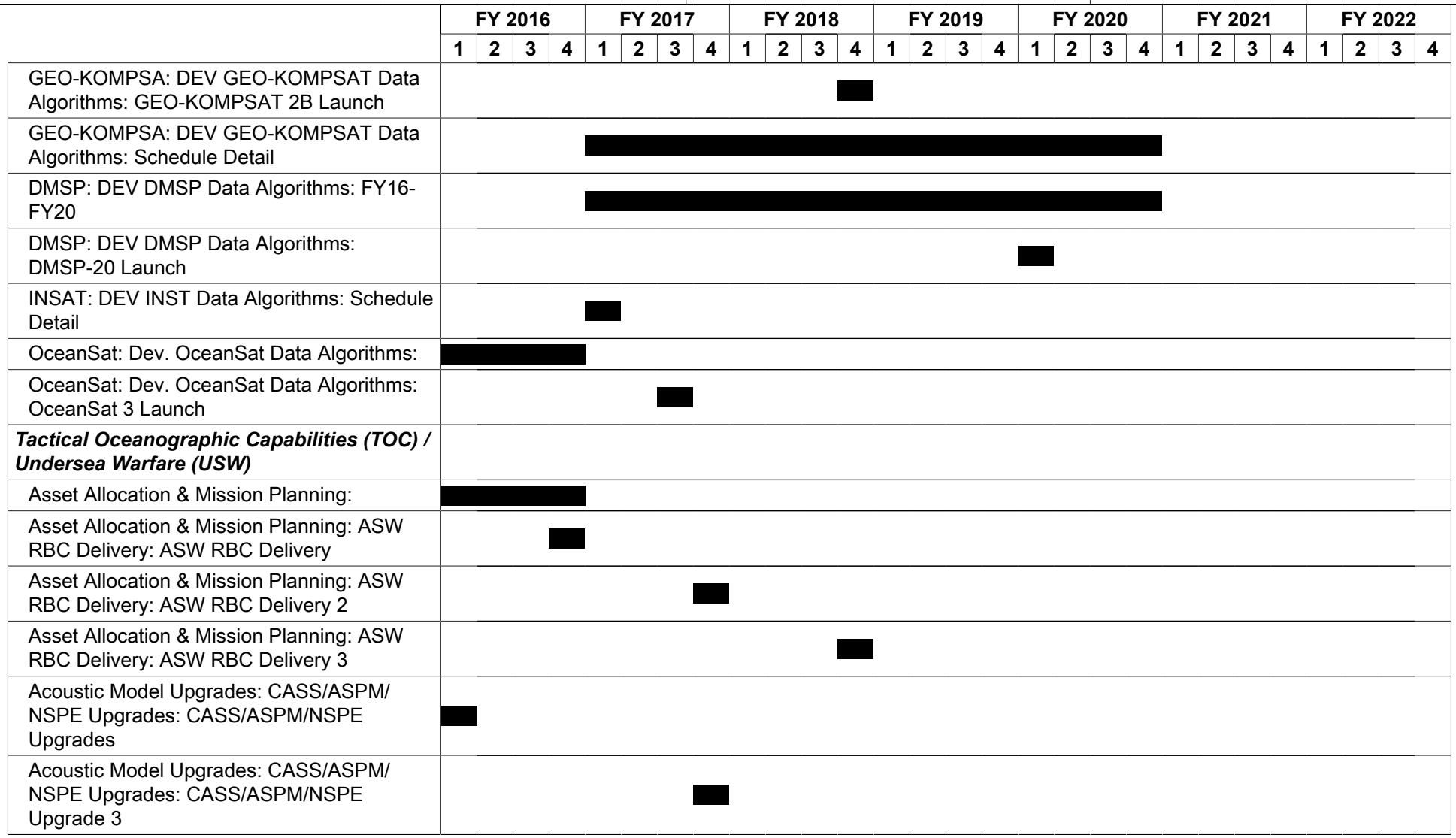


Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

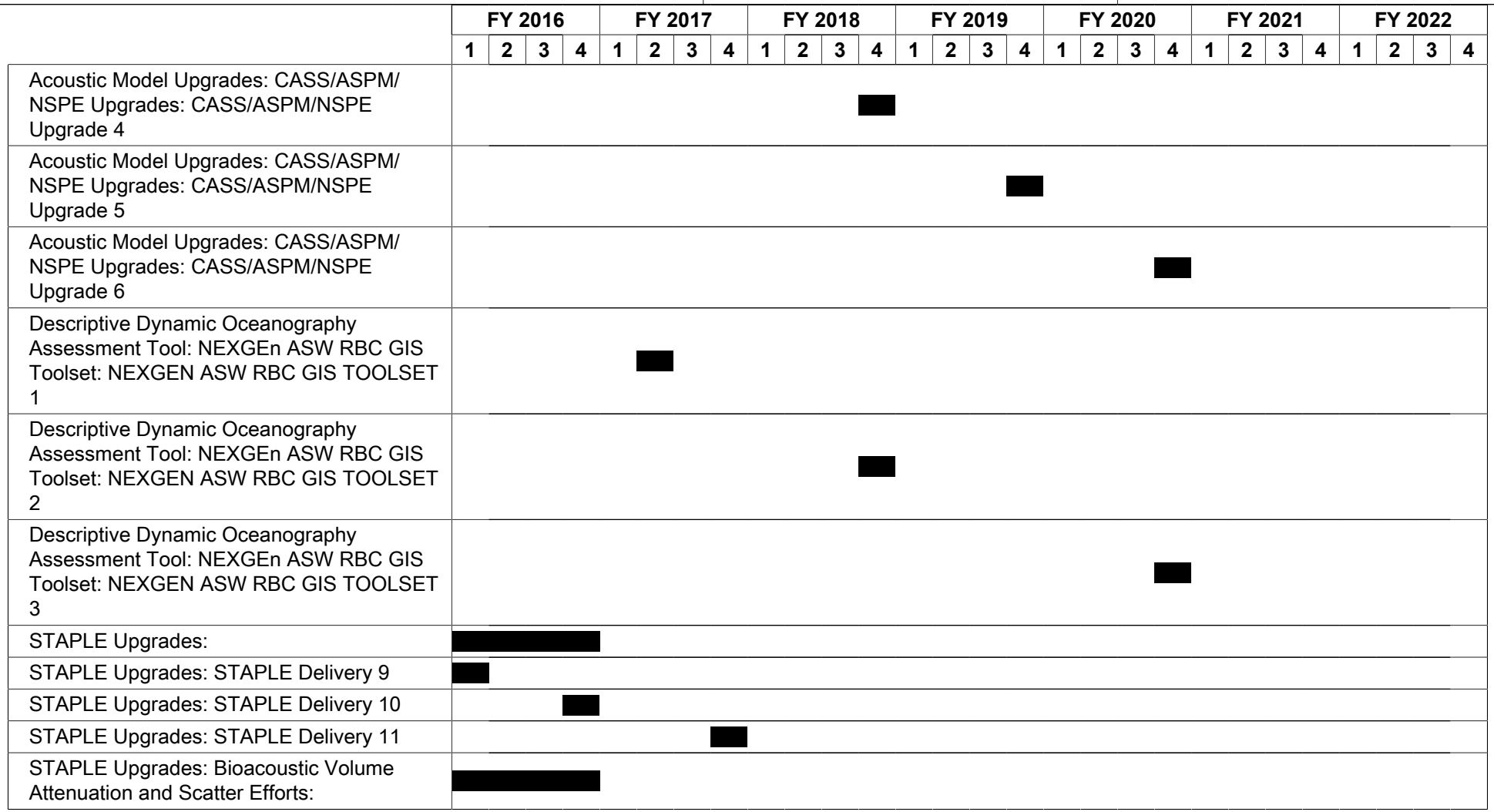


Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

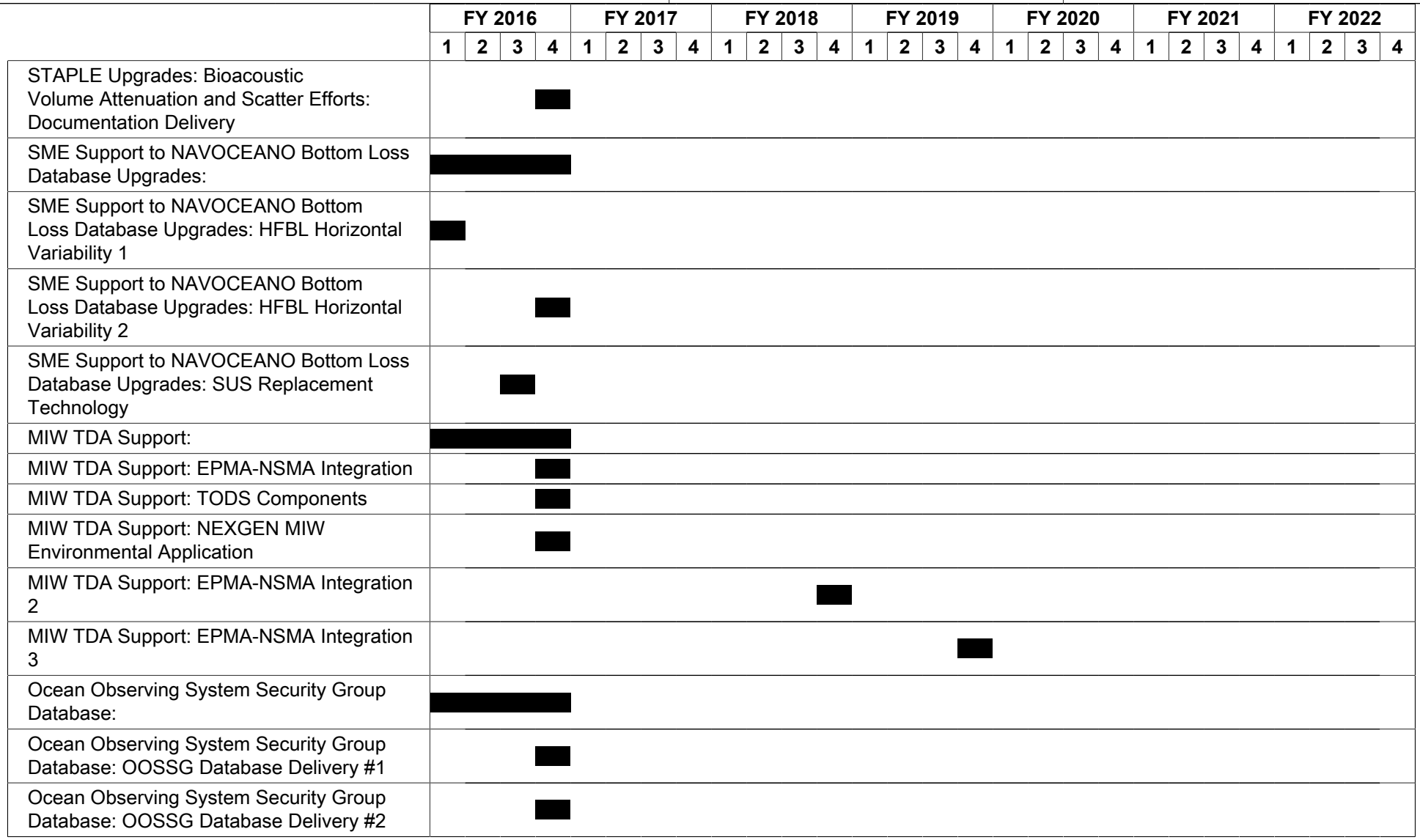


Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

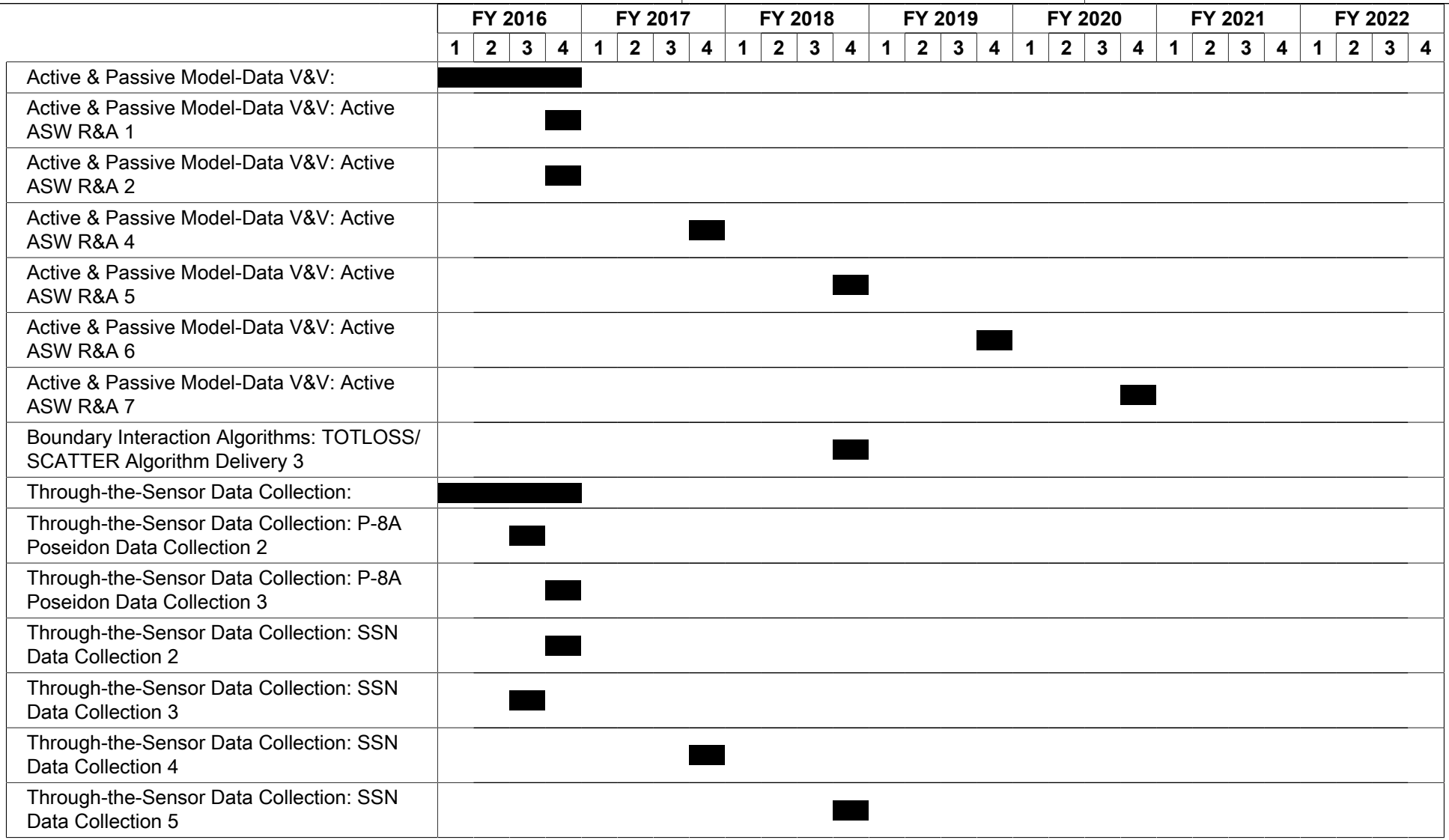


Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

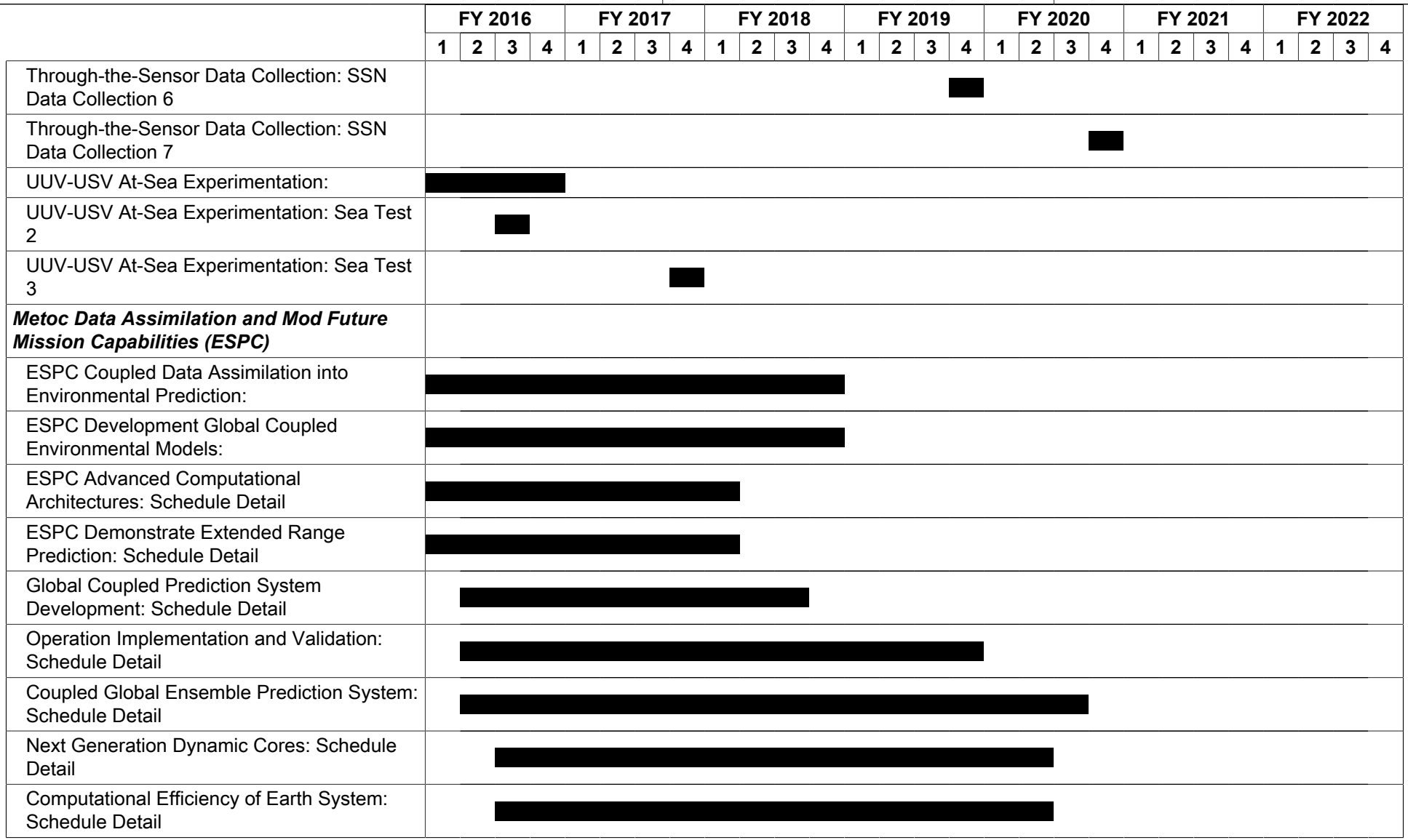


Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

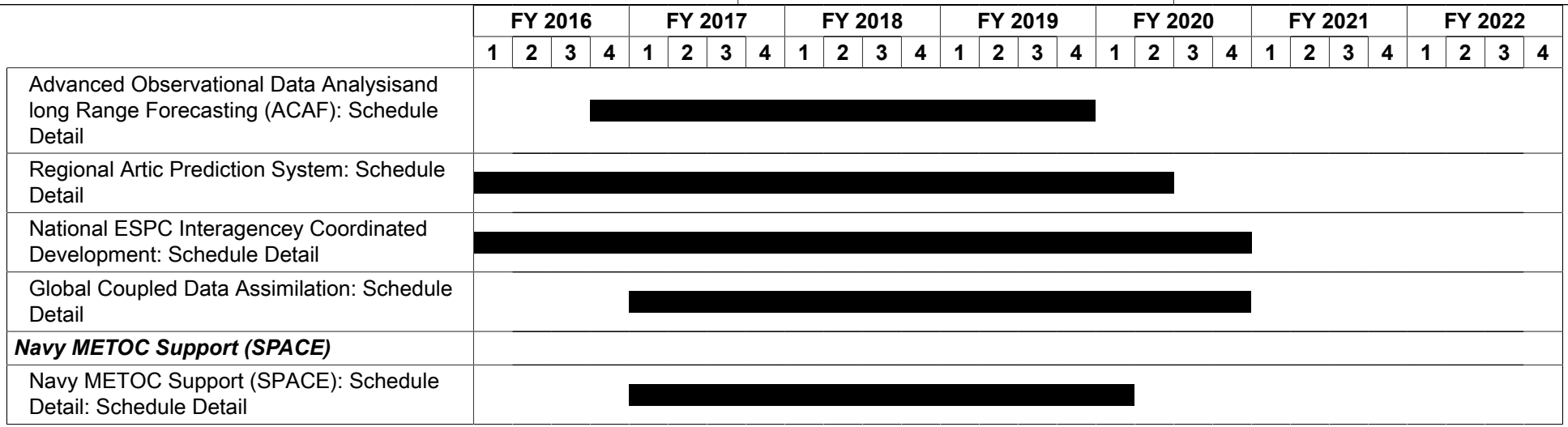


Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

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	2016	4	2020
METOC FMC: Develop Oceanographic and Atmospheric Forecast Models:	1	2016	4	2020
METOC FMC: Oceanographic and Atmospheric Forecast Model Data Assimilation:	1	2016	4	2017
METOC FMC: Decision Support & Performance Prediction Tools:	1	2016	4	2020
METOC FMC: Accelerate Development of Ocean Forecast Systems:	1	2016	4	2018
METOC FMC: Develop/Demonstrate a Tropospheric Modeling Capability:	1	2016	4	2016
METOC Space-Based Sensing Capabilities				
NPP/JPSS: Dev. NPP/JPSS Data Algorithms: FY16-FY20	1	2016	4	2020
NPP/JPSS: Dev. NPP/JPSS Data Algorithms: JPSS-1 Launch	3	2017	3	2017
GOES: Dev. GOES Algorithms: GOES-R Launch	1	2016	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	2016	1	2020
GCOM: Dev. GCOM: GCOM-W2 Launch	3	2016	3	2016
GCOM: Dev. GCOM: GCOM-W3 Launch	3	2020	3	2020
Sentinel: Dev. Sentinel Data Algorithms:	1	2016	4	2016
Sentinel: Dev. Sentinel Data Algorithms: Sentinel 3A Launch	3	2016	3	2016
Sentinel: Dev. Sentinel Data Algorithms: Sentinal 3B Launch	3	2016	3	2016
EarthCare: Dev. EarthCARE Data Algorithms: EarthCARE Launch	3	2017	3	2017
EarthCare: Dev. EarthCARE Data Algorithms: Schedule Detail	1	2016	4	2020
Cosmic: DEV Cosmic Data Algorithms: Schedule Detail	1	2016	4	2020

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
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
METOP: DEV METOP Data Algorithms: METOP-C Launch	3	2018	3	2018
Jason: Dev Jason Algorithm: FY16-FY20	1	2016	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:	1	2016	4	2016
OceanSat: Dev. OceanSat Data Algorithms: OceanSat 3 Launch	3	2017	3	2017
Tactical Oceanographic Capabilities (TOC) / Undersea Warfare (USW)				
Asset Allocation & Mission Planning:	1	2016	4	2016
Asset Allocation & Mission Planning: ASW RBC Delivery: ASW RBC Delivery	4	2016	4	2016
Asset Allocation & Mission Planning: ASW RBC Delivery: ASW RBC Delivery 2	4	2017	4	2017
Asset Allocation & Mission Planning: ASW RBC Delivery: ASW RBC Delivery 3	4	2018	4	2018
Acoustic Model Upgrades: CASS/ASPM/NSPE Upgrades: CASS/ASPM/NSPE Upgrades	1	2016	1	2016
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

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
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
STAPLE Upgrades:	1	2016	4	2016
STAPLE Upgrades: STAPLE Delivery 9	1	2016	1	2016
STAPLE Upgrades: STAPLE Delivery 10	4	2016	4	2016
STAPLE Upgrades: STAPLE Delivery 11	4	2017	4	2017
STAPLE Upgrades: Bioacoustic Volume Attenuation and Scatter Efforts:	1	2016	4	2016
STAPLE Upgrades: Bioacoustic Volume Attenuation and Scatter Efforts: Documentation Delivery	4	2016	4	2016
SME Support to NAVOCEANO Bottom Loss Database Upgrades:	1	2016	4	2016
SME Support to NAVOCEANO Bottom Loss Database Upgrades: HFBL Horizontal Variability 1	1	2016	1	2016
SME Support to NAVOCEANO Bottom Loss Database Upgrades: HFBL Horizontal Variability 2	4	2016	4	2016
SME Support to NAVOCEANO Bottom Loss Database Upgrades: SUS Replacement Technology	3	2016	3	2016
MIW TDA Support:	1	2016	4	2016
MIW TDA Support: EPMA-NSMA Integration	4	2016	4	2016
MIW TDA Support: TODS Components	4	2016	4	2016

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
MIW TDA Support: NEXGEN MIW Environmental Application	4	2016	4	2016
MIW TDA Support: EPMA-NSMA Integration 2	4	2018	4	2018
MIW TDA Support: EPMA-NSMA Integration 3	4	2019	4	2019
Ocean Observing System Security Group Database:	1	2016	4	2016
Ocean Observing System Security Group Database: OOSSG Database Delivery #1	4	2016	4	2016
Ocean Observing System Security Group Database: OOSSG Database Delivery #2	4	2016	4	2016
Active & Passive Model-Data V&V:	1	2016	4	2016
Active & Passive Model-Data V&V: Active ASW R&A 1	4	2016	4	2016
Active & Passive Model-Data V&V: Active ASW R&A 2	4	2016	4	2016
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:	1	2016	4	2016
Through-the-Sensor Data Collection: P-8A Poseidon Data Collection 2	3	2016	3	2016
Through-the-Sensor Data Collection: P-8A Poseidon Data Collection 3	4	2016	4	2016
Through-the-Sensor Data Collection: SSN Data Collection 2	4	2016	4	2016
Through-the-Sensor Data Collection: SSN Data Collection 3	3	2016	3	2016
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:	1	2016	4	2016
UUV-USV At-Sea Experimentation: Sea Test 2	3	2016	3	2016

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
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	2016	4	2018
ESPC Development Global Coupled Environmental Models:	1	2016	4	2018
ESPC Advanced Computational Architectures: Schedule Detail	1	2016	1	2018
ESPC Demonstrate Extended Range Prediction: Schedule Detail	1	2016	1	2018
Global Coupled Prediction System Development: Schedule Detail	2	2016	3	2018
Operation Implementation and Validation: Schedule Detail	2	2016	4	2019
Coupled Global Ensemble Prediction System: Schedule Detail	2	2016	3	2020
Next Generation Dynamic Cores: Schedule Detail	3	2016	2	2020
Computational Efficiency of Earth System: Schedule Detail	3	2016	2	2020
Advanced Observational Data Analysisand long Range Forecasting (ACAF): Schedule Detail	4	2016	4	2019
Regional Artic Prediction System: Schedule Detail	1	2016	2	2020
National ESPC Interagencey Coordinated Development: Schedule Detail	1	2016	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: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603207N / *Air/Ocean Tactical Applications*	Project (Number/Name) 2343 / *Tactical METOC Applications*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2343: *Tactical METOC Applications*	144.390	9.059	13.473	11.715	-	11.715	12.844	13.993	14.304	14.614	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

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) METOC Decision Aids and, 2) Operational Effects Decision Aids (OEDAs). Meteorological and Oceanographic (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.

FY 2018 request provides for NITES-Next Fleet Capability Release-3 (FCR-3) Build Technical Review (BTR), FCR-3 Build Decision (BD), and FCR-3 development. NITES-Next will conduct Application Integration (AI) System Integration Test (SIT) on the Consolidated Afloat Networks and Enterprise Services (CANES) Network. NITES-Next will also begin the development of a new mobile variant which will replace the current NITES-Fielded mobile variant.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2343 / *Tactical METOC Applications*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Naval Integrated Tactical Environmental System Next Generation (NITES-Next)	9.059	13.473	11.715	0.000	11.715
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Naval Integrated Tactical Environment System - Next Generation (NITES-Next) conducted System Integration Testing (SIT) #1, SIT #2, Systems Qualification Testing (SQT), User Assessment (UA) and Developmental Testing and Evaluation (DT&E) events for Fleet Capability Releases (FCR)-2. Participated in Consolidated Afloat Network and Enterprise Services (CANES) Application Integration (AI) SIT events. NITES-Next continued to improve the FCR-2 software capability using the follow-on contract. NITES-Next conducted the Fielding Technical Review (FTR) for FCR-2. The program planned the FCR-3 development activities.					
FY 2017 Plans: The program obtained an FCR-2 Fielding Decision (FD) from the Milestone Decision Authority (MDA). The program obtained an Authorization to Operate (ATO) for FCR-2. The program will integrate FCR-2 into the Navy Tactical Cloud Reference Implementation (NTCRI). NITES-Next will incorporate new, robust Department of Defense (DoD)/Department of Navy (DoN) cybersecurity standards in the design of FCR-3 software and finalize the documentation (including Requisition Definition Package (RDP), Technology Readiness Assessment (TRA) Addendum 2, Cost Analysis Requirements Description (CARD), Program Life Cycle Cost Estimate (PLCCE), Acquisition Strategy (AS), and Acquisition Program Baseline (APB) for the FCR-3 Build Decision (BD). NITES-Next will award a task order for the development of FCR-3. NITES-Next will prepare for and conduct an FCR-3 Build Technical Review (BTR), prepare for FCR-3 BD, and begin to develop FCR-3 software that is anti-tamper proof and releasable to our allies to enhance our interoperability with their information warfare systems. NITES-Next will plan for SIT, SQT, UA, and DT&E for FCR-3. The program will plan the initial FCR-4 development activities and begin planning for contract actions in support of FCR-4.					
FY 2018 Base Plans: NITES-Next will continue work on the FCR-3 Task Order. NITES-Next will begin initial software development of FCR 3 mobile variant, which integrates new mobile variant requirements with the previous afloat version of FCR 2. The new mobile variant will replace the current NITES-Fielded suite of systems that have been determined to have cyber vulnerabilities and need to be retired as soon as possible. The NITES-Next program will begin SIT and SQT activities in support of the planned CANES AI/SIT and DT&E events. The program will continue planning for the FCR-4 development activities (including updating of all required documentation, RDP, CARD, PLCCE). NITES-Next will continue integration into the Navy Tactical Cloud Reference Implementation (NTCRI).					
FY 2018 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2343 / *Tactical METOC Applications*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A					
Accomplishments/Planned Programs Subtotals	9.059	13.473	11.715	0.000	11.715

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

The Naval Integrated Tactical Environmental System Next Generation (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 NITES-Next program's acquisition and contracting strategies. The DoN's requirements for the 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: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2343 / *Tactical METOC Applications*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
NITES/NITES-Next	Various	Various : Various	111.017	0.000		0.000		0.000		-		0.000	0.000	111.017	-
NITES-Next	WR	SSC Pacific : San Diego, CA	16.027	3.707	Dec 2015	4.212	Oct 2016	3.758	Nov 2017	-		3.758	Continuing	Continuing	Continuing
NITES-Next	C/FP	SAIC : Virginia	5.431	2.013	Dec 2015	2.472	Feb 2017	2.051	Dec 2017	-		2.051	Continuing	Continuing	Continuing
NITES-Next	WR	SSC Atlantic : South Carolina	0.200	0.071	Oct 2015	0.105	Apr 2017	0.087	Oct 2017	-		0.087	Continuing	Continuing	Continuing
NITES-Next / Engineering	C/IDIQ	NAVSUP : Pennsylvania	0.000	0.000		1.300	May 2017	0.000		-		0.000	0.000	1.300	-
NITES-Next/ SW	C/FP	GDIT : Virginia	4.120	0.000		0.000		0.000		-		0.000	0.000	4.120	-
NITES-Next / Eng	C/IDIQ	SSC PACIFIC : Various	0.000	1.650	May 2016	0.000		0.000		-		0.000	0.000	1.650	-
NITES-Next / Engineering	C/IDIQ	SSC PACIFIC : Various	0.000	0.000		3.423	May 2017	3.791	May 2018	-		3.791	Continuing	Continuing	Continuing
NITES-Next	C/BA	PS&E : Washington	0.207	0.000		0.000		0.000		-		0.000	0.000	0.207	-
NITES-Next	C/BA	COTF : Virginia	0.121	0.000		0.000		0.000		-		0.000	0.000	0.121	-
		Subtotal	137.123	7.441		11.512		9.687		-		9.687	-	-	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Support Cost	C/CPIF	IPD : Various	0.595	0.000		0.000		0.000		-		0.000	0.000	0.595	-
NITES-Next	C/FP	SAIC : Virginia	4.265	0.959	Dec 2015	1.191	Feb 2017	1.232	Dec 2017	-		1.232	Continuing	Continuing	Continuing
NITES-Next	C/FP	NAVAIR : Maryland	0.125	0.000		0.000		0.000		-		0.000	0.000	0.125	-
		Subtotal	4.985	0.959		1.191		1.232		-		1.232	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2343 / *Tactical METOC Applications*

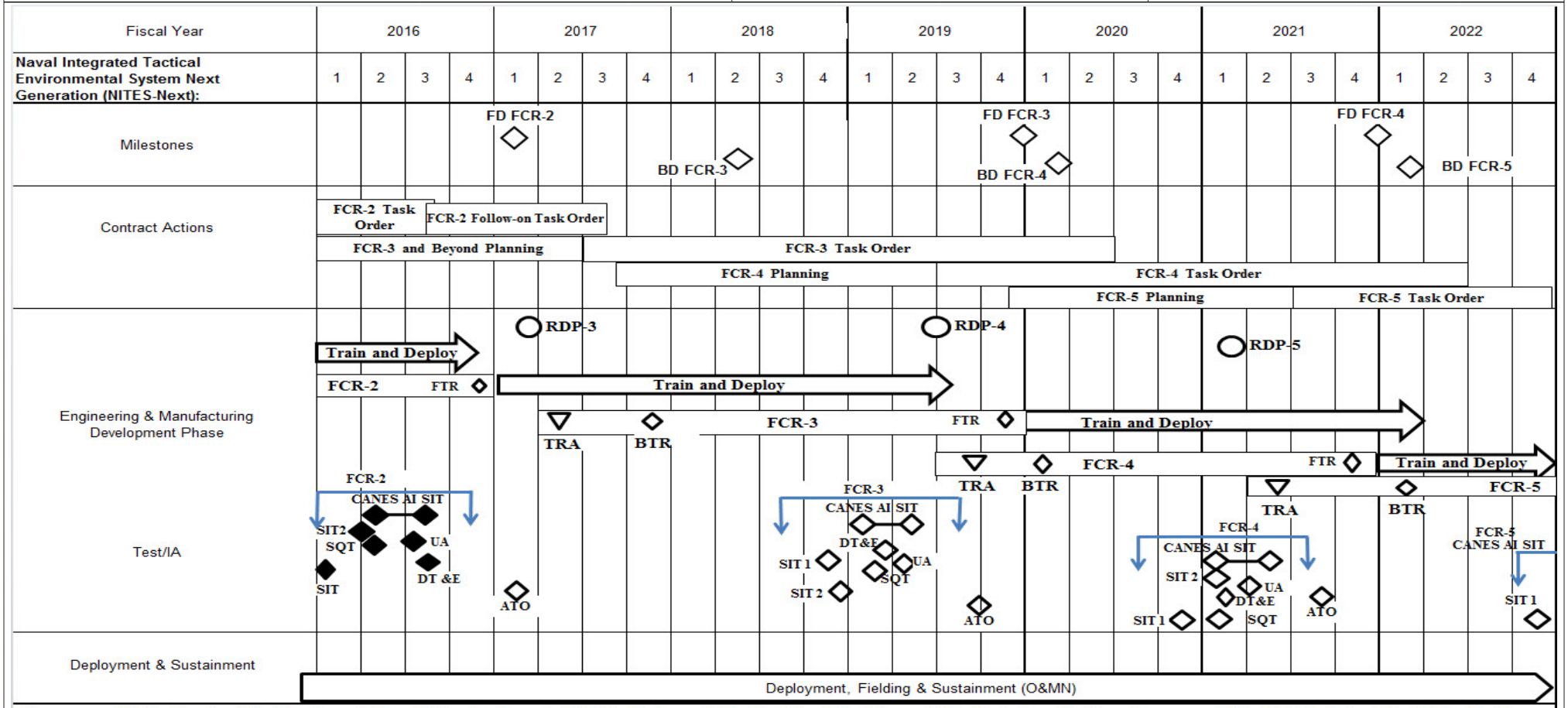
Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Acquisition Workforce	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	0.800	0.340	Dec 2015	0.293	Oct 2016	0.303	Nov 2017	-		0.303	Continuing	Continuing	Continuing
NITES-Next	C/FP	BAH : San Diego, CA	1.451	0.319	Dec 2015	0.477	Dec 2016	0.493	Dec 2017	-		0.493	0.000	2.740	-
		Subtotal	2.282	0.659		0.770		0.796		-		0.796	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	144.390	9.059		13.473		11.715		-		11.715	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 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: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 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 Fleet Capability Release - 3	2	2018	2	2018
Milestones: Fielding Decision Fleet Capability Release - 2	1	2017	1	2017
Milestones: Build Decision Fleet Capability Release - 4	1	2020	1	2020
Milestones: Fielding Decision Fleet Capability Release - 3	4	2019	4	2019
Milestones: Fielding Decision Fleet Capability Release - 4	4	2021	4	2021
Milestones: Building Decision Fleet Capability Release - 5	1	2022	1	2022
Contract Actions: FCR-2 Task Order	1	2016	3	2016
Contract Actions: FCR-3 Task Order	3	2017	2	2020
Contract Actions: FCR-3-Beyond Planning	1	2016	2	2017
Contract Actions: FCR-4 Task Order	3	2019	2	2022
Contract Actions: FCR-4 Planning	3	2017	2	2019
Contract Actions: FCR-5 Planning	4	2019	3	2021
Contract Actions: FCR-5 Task Order	3	2021	4	2022
Engineering & Manufacturing Development Phase: Fleet Capability Release - 2 / Train Deploy	1	2017	3	2019
Engineering & Manufacturing Development Phase: Fleet Capability Release - 3 / Train Deploy	1	2020	1	2022
Engineering & Manufacturing Development Phase: Fleet Capability Release - 4 / Train and Deploy	1	2022	4	2022
Engineering & Manufacturing Development Phase: Fleet Capability Release - 5	2	2021	4	2022
Engineering & Manufacturing Development Phase: Requirements Definition Package - 3	1	2017	1	2017

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2343 / *Tactical METOC Applications*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Engineering & Manufacturing Development Phase: Requirements Definition Package - 4	2	2019	2	2019
Engineering & Manufacturing Development Phase: Requirements Definition Package - 5	1	2021	1	2021
Engineering & Manufacturing Development Phase: Build Technical Review FCR-3	4	2017	4	2017
Engineering & Manufacturing Development Phase: Build Technical Review FCR-4	1	2020	1	2020
Engineering & Manufacturing Development Phase: Build Technical Review FCR-5	1	2022	1	2022
Engineering & Manufacturing Development Phase: Technology Readiness Assessment - 3	2	2017	2	2017
Engineering & Manufacturing Development Phase: Technology Readiness Assessment - 4	3	2019	3	2019
Engineering & Manufacturing Development Phase: Technology Readiness Assessment - 5	2	2021	2	2021
Engineering & Manufacturing Development Phase: Field Technical Review FCR-2	4	2016	4	2016
Engineering & Manufacturing Development Phase: Field Technical Review FCR-3	4	2019	4	2019
Engineering & Manufacturing Development Phase: Field Technical Review FCR-4	4	2021	4	2021
Test/IA: Fleet Capability Release - 2	1	2016	4	2016
Test/IA: Fleet Capability Release - 3	3	2018	3	2019
Test/IA: Fleet Capability Release - 4	3	2020	3	2021
Test/IA: Fleet Capability Release - 5	4	2022	4	2022
Test/IA: System Integration Test - 1 (FCR-2)	1	2016	1	2016
Test/IA: System Integration Test - 2 (FCR-2)	2	2016	2	2016
Test/IA: System Integration Test - 1 (FCR-3)	4	2018	4	2018
Test/IA: System Integration Test - 2 (FCR-3)	4	2018	4	2018
Test/IA: System Integration Test - 1 (FCR-4)	4	2020	4	2020
Test/IA: System Integration Test - 2 (FCR4)	1	2021	1	2021
Test/IA: System Integration Test - 1 (FCR-5)	4	2022	4	2022

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2343 / *Tactical METOC Applications*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Test/IA: Authority to Operate FCR-2	1	2017	1	2017
Test/IA: Authority to Operate FCR-3	3	2019	3	2019
Test/IA: Authority to Operate FCR-4	3	2021	3	2021
Test/IA: System Qualification Test FCR-2	2	2016	2	2016
Test/IA: System Qualification Test FCR-3	1	2019	1	2019
Test/IA: System Qualification Test FCR-4	1	2021	1	2021
Test/IA: Developmental Test Fleet Capability Release - FCR-2	3	2016	3	2016
Test/IA: Developmental Test Fleet Capability Release - FCR-3	1	2019	1	2019
Test/IA: Developmental Test Fleet Capability Release - FCR-4	1	2021	1	2021
Test/IA: User Assessment FCR-2	3	2016	3	2016
Test/IA: User Assessment FCR-3	2	2019	2	2019
Test/IA: User Assessment FCR-4	2	2021	2	2021
Test/IA: CANES AI SIT FCR-2	2	2016	3	2016
Test/IA: CANES AI SIT FCR-3	1	2019	2	2019
Test/IA: CANES AI SIT FCR-4	1	2021	2	2021
Test/IA: Deployment and Sustainment: Deployment, fielding and Sustainment (OMN)	1	2016	4	2022

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603207N / *Air/Ocean Tactical Applications*	Project (Number/Name) 2344. / *Precise Time and Astrometry*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2344.: *Precise Time and Astrometry*	8.600	4.797	5.636	5.190	-	5.190	4.705	3.072	3.127	3.132	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 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. 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. The Navy is also responsible for providing astronomical data for military and NTM navigation, positioning, and guidance capabilities that are space-based.

The PTA research and development efforts are focused on several areas relating to timing and time transfer: (1) Development of Rubidium Fountain Atomic Clocks and development of improved GPS Timing Receivers in order to meet the precise timing requirements for the GPS III system; (2) Research & development of the capability of distributing timing signals via Optical fiber lines, as an alternative and backup to GPS time distribution; and (3) Research & development into Optical Clock technology, which is expected to be required for future DoD systems. The PTA research and development effort is also focused on the following areas related to Earth Orientation Parameter (EOP) determination: (1) Upgrade of the Very Long Baseline Interferometry (VBLI) data acquisition system / radio telescope at Kokee Park HI; (2) Development of a Software (SW) Correlator for processing of VLBI data, necessary for the generation of Earth Orientation Parameter (EOP) data; (3) Development of the capability for electronic transmission of the VLBI data from remote VLBI sites to the USNO correlator. The new SW Correlator and the eVLBI infrastructure upgrades are necessary to support daily updates of EOP data required by GPS III; (4) Development of an automated end-to-end EOP processing system, which combines input from multiple data sets (e.g. VLBI data, GPS orbit data, and laser ranging data, etc.). This process is currently very labor intensive and costly. Automation is necessary to meet future DoD and GPS requirements; and (5) Modifications to the EOP system for compatibility with the new international standard -'VLBI2010'.

The Critical Time Dissemination (CTD) aspect of the PTA program develops enhanced methods of distributing and verifying precise time back to the Master Clock, UTC (USNO). The development aspect of this project has four parts: (1) Development of a mobile time link; (2) Refinement of and modernization of the Hydrogen Maser and Auxilary Offset Generator (AOG); (3) Customize a timing system to develop a Site Verification System; and (4) Produce a fiber link system to transfer the Master Clock down long-haul fiber.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2344. / *Precise Time and Astrometry*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Precise Timing and Astronomy	4.797	5.636	5.190	0.000	5.190
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 2016 Accomplishments: Master Clock and Time Distribution: Two Navy Rb Fountains (NRF6 and NRF7) are now located in the Alternate Master Clock Facility and have demonstrated excellent stability and have achieved Initial Office Capability (IOC). Lab demonstration of the fiber optic cable have been successful and a fiber link between USNO and NRL is showing excellent stability. Critical Time Dissemination tech refresh activities are proceeding. Earth Orientation: Very Long Baseline Interferomtry System (VLBI) Software (SW) correlator has achieved FOC and is now the operational VLBI correlator at United States Naval Observatory (USNO). The Graphical User Interface (GUI) is now the primary method of interfacing with the SW correlator. The VLBI2010 antenna has been installed and accepted at Kokee Park Observatory in Hawaii. The VLBI 2010 signal chain has been installed and the entire system has achieved Initial Office Capability (IOC). Two contracts for a programmers to work on the EOP Automation have been awarded and one of the three processing paths for EOP production is now under software monitoring.					
FY 2017 Plans: - Final Operating Capability (FOC) for Rb Fountains at USNO Alternate Master Clock facility - Continue Optical Fiber timing link demonstrations in fiber network - Continue Critical Time Dissemination Activities - Continue EOP Automation work - Complete FACD study for 1.8m telescope enclosure at NOFS - Begin 1.8m construction contracting and kickoff activities					
FY 2018 Base Plans: - Field operational Optical Fiber timing link in DC metro area - Lab demonstration of optical clock prototype - Continue Critical Time Dissemination Activities - Transition EOP automation products to operations - FOC for Kokee Park radio telescope					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2344. / *Precise Time and Astrometry*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
* Complete 1.8m telescope enclosure at NOFS ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	4.797	5.636	5.190	0.000	5.190

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 (OPN-funded) 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) Antenna will be installed at Kokee Park, HI.
(3) Rb Fountain System will reach FOC at AMC in FY17.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603207N / *Air/Ocean Tactical Applications*	Project (Number/Name) 2363. / *Remote Sensing Capability Development*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2363.: *Remote Sensing Capability Development*	4.949	2.406	3.855	3.959	-	3.959	3.990	4.033	4.109	4.189	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

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 2018 request provides for continued target data collection, enhancements on algorithms and continue to integrate algorithms for access over the network.

FY18 funds increase 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 characterized 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.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Remote Sensing Capability Development	1.770	3.636	3.899	0.000	3.899
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Continued data collection in various weather and sea states to broaden the range of environmental conditions and reduced uncertainty in environmental prediction. Continued software algorithm enhancements to automatically detect oceanographic phenomena. Conducted algorithm Acceptance Decision. Continued to integrate algorithms for access over the network. Conducted Algorithm Transition Board. Continued to evolve 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. Provided Navy leadership status on emerging capabilities.					
FY 2017 Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2363. / *Remote Sensing Capability Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Develop data collection strategy and collections process. Continue data collection in various weather and sea states to broaden the range of environmental conditions and reduce uncertainty in environmental prediction. Conduct 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. Develop and implement the algorithm performance assessment strategy as well as the test and evaluation plans. Document software algorithm test reports. Conduct algorithm Acceptance Decision. Continue to integrate algorithms for access over the network. Conduct algorithm Fielding Decision. 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. Provide Navy leadership status on emerging capabilities. ***FY 2018 Base Plans:*** 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 the network. Continue development of training to provide the user community education on using the different tools and applications. Coordinate TCPED process amongst inter-agencies to support Navy Missions. Award contract for Development and Integration efforts. Conduct algorithm Fielding Decision. Award contract for Development and Integration efforts. ***FY 2018 OCO Plans:*** N/A					
Title: Remote Sensing Capability Dev. ***Articles:*** ***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)	0.636 -	0.219 -	0.060 -	0.000 -	0.060 -

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2363. / *Remote Sensing Capability Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
FY 2016 Accomplishments: -Continue remote sensing system capability development -Develop and enhance software algorithms to automatically detect oceanographic phenomena ***FY 2017 Plans:*** - Continue all efforts of FY 2016 less those noted as completed above. - Coordinate TCPED process across DoD and civilian government agencies to support Navy Missions. ***FY 2018 Base Plans:*** Continue all efforts of FY 2017 less those noted as completed above. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	2.406	3.855	3.959	0.000	3.959

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Remote Sensing Capability Development is being managed as a 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-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603207N / *Air/Ocean Tactical Applications*	Project (Number/Name) 3207 / *Fleet Synthetic Training*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3207: *Fleet Synthetic Training*	0.509	0.957	0.970	0.253	-	0.253	0.274	0.294	0.315	0.336	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.

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 pierside 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.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Fleet Synthetic Training	0.957	0.970	0.253	0.000	0.253
Articles:	-	-	-	-	-
Description: Develop and deliver 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. Accomplishments include development of meteorological and oceanographic environmental databases for total of 14 Navy Continuous Training Environment (NCTE) exercise areas. Conducted data and architecture testing between Commander, Naval Meteorology and Oceanography Command (CNMOC) data and the Environmental Data Cube Support System (EDCSS). Integrated environmental database hosting at the Naval Oceanographic Office. Developed capability to realistically simulate bathythermograph data collection based on					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 3207 / *Fleet Synthetic Training*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
synthetic ocean environment for total of 14 NCTE areas. Enhanced realism of training environment by providing synthetic satellite/radar imagery based on synthetic enviromental data. Made improvements in generating acoustic performance products used by Anti-Submarine Warfare (ASW) white cell and ASW commander staff. Conducted verification and validation of acoustic performance products. ***FY 2016 Accomplishments:*** - Developed Modeling on Demand capability resident in new version of Coupled Ocean/Atmosphere Mesoscale Prediction System On Scene (COAMPS-OS). - Completed conversion of 17 year Hybrid Coordinate Ocean Model (HYCOM) database to mineable format. - Commenced development of a virtual testbed to develop new EDCSS related capabilities. Commenced development of a wide-area network capability to overcome bandwidth limitations and more effectively deliver METOC to all NCTE constituencies. - Commenced development of an in-situ modification capability for EDCSS (WxSim). Continued work on FMV support and research into METOC impacts on Joint Semi-Automated Forces (JSAF) application, and NextGen Threat System. - Completed accreditation of EDCSS. ***FY 2017 Plans:*** - Complete development of METOC Base Objective Model (BOM) content delivery mechanism on the Wide Area Network (WAN) - Research EDCSS Cloud architecture (COOP capability and potential for shipboard integration). - Complete work on virtual testbed and research METOC impacts on Joint Semi-Automated Forces (JSAF) application, and NextGen Threat System. - Develop WxSim (On-site METOC scenario control and editing) ***FY 2018 Base Plans:*** - Develop Machine-to-Machine (M2M) capability for Environmental Data Cube Support System (EDCSS) interface in support of environmental product generation. - Research possible Fleet Synthetic Training (FST) integration into advanced training (Integrated team trainers, warfighting development center support, etc.) - 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: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 3207 / *Fleet Synthetic Training*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Develop support for Electromagnetic Spectrum Maneuver Warfare (EMMW) leveraging Full Motion Video/Joint Semi-Automatic Forces/Next Generation Threat System research. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.957	0.970	0.253	0.000	0.253

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

2) NAVIFOR will complete data and architecture integration, including information assurance compliance for provision of synthetic Meteorological and Oceanographic Command (METOC) 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.

3) NAVIFOR 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-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603207N / *Air/Ocean Tactical Applications*	Project (Number/Name) 3404 / *Tactical Environmental Support*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3404: *Tactical Environmental Support*	0.000	0.000	0.000	0.327	-	0.327	0.619	0.648	0.675	0.704	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Tactical Environment Support, initiated in FY 2018, enables the warfighter to leverage environmental data by incorporating them into technological applications that shape the way commanders engage the enemy, take advantage of environmental conditions (and their impacts on systems and sensors) and complete the mission in the most efficient manner feasible. Software decision support tools complement and provide capabilities found in Naval Integrated Tactical Environmental System Next Generation (NITES-Next) Program of Record (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).

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Tactical Environmental Support	0.000	0.000	0.327	0.000	0.327
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 Tactical Environmental Support are realigned to projects and activities that align to the TCPED updated program structure. The Tactical Environmental Support project consolidates environmental focused prior year efforts previously identified in 0603207N (Air/Ocean Tactical Applications) projects Meteorological and Oceanographic (METOC) Data Assimilation and Mod, Meteorological and Oceanographic (METOC) Data Acquisition and in PE 0604218N (Air/Ocean Equipment Engineering) Project 2345.					
FY 2016 Accomplishments: N/A					
FY 2017 Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 3404 / *Tactical Environmental Support*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A ***FY 2018 Base Plans:*** - Continue model data validation efforts - Continue Scalable Tactical Acoustic Propagation Loss Engine (STAPLE) transitions - Continue verification and validation of algorithms through Commander Naval Meteorology and Oceanography Command for operational use - Continued development of Advanced Refractive Effects Prediction System (AREPS) Advance Propagation Model (APM) modules and visualization - Continue development, integration and transition of Naval Research Lab Atmospheric Acoustic Propagation (NRL-AAP) v 3.2. - Continue research that emphasizes the enhancement of METOC Decision Aids (MDAs) and Operational Effects Decision Aids (OEDAs), such as Target Acquisition Weapons Software (TAWS), Electro-optical (EO) - View, STAPLE, ocean wave applications, ship-routing applications and illegal trafficking probability applications. - Continue the enhancement of observational, assimilated and predicted METOC data in order to improve the reliability of MDAs and OEDAs that rely on these data for effectiveness. - Continue work on the ability for MDAs and OEDAs to access data obtained through direct interfaces to Navy combat systems, making them more relevant to specific missions and weapons systems. - Continue efforts that focus on cyber security of all METOC Dissemination applications. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.000	0.000	0.327	0.000	0.327

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.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 3404 / *Tactical Environmental Support*

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-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603207N / *Air/Ocean Tactical Applications*	Project (Number/Name) 3405 / *Decision Support Products & Dissemination*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3405: *Decision Support Products & Dissemination*	0.000	0.000	0.000	0.327	-	0.327	0.619	0.647	0.676	0.704	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Decision Support Products & Dissemination	0.000	0.000	0.327	0.000	0.327
Articles:	-	-	-	-	-
Description: Decision Support Products & Dissemination focuses on efforts to combine real time data (tasking and collection) meteorological and oceanographic forecasts (processing), further derived tactical products (exploitation) into decision support products that can be merged with other sources of operational and intelligence data to clarify the operating environment for commanders at all levels. 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. Decision Support Products and Dissemination related efforts previously identified in 0603207N (Air/Ocean Tactical Applications) projects Meteorological and Oceanographic (METOC) Data Assimilation and Mod, Meteorological and Oceanographic (METOC) Data Acquisition and in PE 0604218N (Air/Ocean Equipment Engineering) Project 2345.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 3405 / *Decision Support Products & Dissemination*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
FY 2016 Accomplishments: N/A ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** - Continue efforts pertaining to ocean and atmosphere model performance assessment and verification to better inform decision makers and mission planners. - Continue development of ASW planning and evaluation tools. - Continue development of optimum ship-routing planning and execution tools. - Continue work to narrow gaps between the NITES-Next POR and existing METOC planning tools and decision aids. - Continue efforts to provide decision aids, or feed environmental information to other developing decision aids to assist commanders at the tactical, operational, and strategic levels of warfare and for non-combat operations. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.000	0.000	0.327	0.000	0.327

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-2, RDT&E Budget Item Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603216N *I Aviation Survivability*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	177.880	5.343	5.239	5.566	-	5.566	5.792	5.825	5.948	6.064	Continuing	Continuing
0584: *Acft Protective Clothing*	97.056	2.279	2.441	2.534	-	2.534	2.613	2.635	2.691	2.743	Continuing	Continuing
0591: *Acft Survivability, Vulnerability & Safety*	43.827	1.434	1.383	1.385	-	1.385	1.516	1.525	1.557	1.587	Continuing	Continuing
0592: *Acft & Ordnance Safety*	34.434	1.043	0.907	1.060	-	1.060	1.067	1.062	1.085	1.108	Continuing	Continuing
1819: *CV Acft Fire Suppress System*	2.563	0.570	0.508	0.587	-	0.587	0.596	0.603	0.615	0.626	Continuing	Continuing
9999: *Congressional Adds*	0.000	0.017	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	0.017

Note

9999 Congressional Add belongs to 0603261N.

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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	10.904	5.239	5.847	-	5.847
Current President's Budget	5.343	5.239	5.566	-	5.566
Total Adjustments	-5.561	0.000	-0.281	-	-0.281
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-5.311	0.000			
• SBIR/STTR Transfer	-0.249	0.000			
• Program Adjustments	0.000	0.000	-0.248	-	-0.248

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy					Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*		R-1 Program Element (Number/Name) PE 0603216N *I Aviation Survivability*			
• Rate/Misc Adjustments	-0.001	0.000	-0.033	-	-0.033

Congressional Add Details ($ in Millions, and Includes General Reductions)

	FY 2016	FY 2017
Project: 9999: *Congressional Adds*		
Congressional Add: *Unmanned System Integration*	0.017	0.000
Congressional Add Subtotals for Project: 9999	0.017	0.000
Congressional Add Totals for all Projects	0.017	0.000

Change Summary Explanation

Technical: Not applicable.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603216N / *Aviation Survivability*	Project (Number/Name) 0584 / *Acft Protective Clothing*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0584: *Acft Protective Clothing*	97.056	2.279	2.441	2.534	-	2.534	2.613	2.635	2.691	2.743	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Advanced Technology Crew Station	1.246	1.292	1.158	0.000	1.158
Articles:	-	-	-	-	-

FY 2016 Accomplishments:

Complete integration and development of 4 megapixel sensor, display, and electronics into a new variant of a night vision goggle. Integrated units will be used for environmental and other required testing to ready the capability for transition into safety of flight testing. Begin work on ultra-high resolution displays (20/15 acuity at overcast starlight) and solid state low light sensors. Begin verification and validation of head, neck and spine model for helmet mounted displays and the model's predictive validity of head mounted systems during crash events.

FY 2017 Plans:

Continue development of the seat vibration attenuation and continue to mature an aviation physiologic monitoring/warning system. Develop and evaluate potential second sources for high resolution digital near infra-red sensors and micro displays. Pursue the new silicon wafer design, Next Gen Electron Bombarded Active Pixel Sensor. Explore solid state low light sensors; alternate micro display technologies such as Wave Guide, Quantum dot, and flexible displays; and short wave infra-red sensor development.

FY 2018 Base Plans:

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,

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603216N / *Aviation Survivability*	**Project (Number/Name)** 0584 / *Acft Protective Clothing*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
and flexible displays; and near and short wave infra-red sensor development. Explore technologies to improve aircraft seating and body-mounted equipment to increase mission endurance and enhance crashworthiness. Complete testing, and refinement as necessary, of the seat damper system and active seat cushion. ***FY 2018 OCO Plans:*** N/A					
Title: Advanced Integrated Life Support System	1.033	1.149	1.376	0.000	1.376
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Integrate recently patented stacked optical filter test methodology/device and determine true optical power and limits for helmet mounted systems. Complete and validate indicator of solar degradation on protective eyewear and equipment. Continue development of in-house expertise in digital human modeling and 3D scanning capabilities. ***FY 2017 Plans:*** Investigate active visor tinting and prototype integration with advanced helmet mounted display concepts. Assess optical quality of compound multiple surfaces on the aggregate optical powers. Complete testing of solarization indicators and determine type and location on spectacle or visor systems. Upgrade laser systems to assess the impact on laser bleaching of ultra-short pulses. Continue to mature on shore supplier of Dielectric Coatings. Mature digital human modeling capability which may include investing in additional crash testing. Performance moderators to the SANTOSHUMAN suite and add an additional joint H-46 crash test. ***FY 2018 Base Plans:*** 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. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	2.279	2.441	2.534	0.000	2.534

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603216N / *Aviation Survivability*	**Project (Number/Name)** 0584 / *Acft Protective Clothing*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• OPN 4268: *Aviation Support Equipment*	48.773	39.099	33.838	29.245	63.083	32.520	45.835	47.136	62.044	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-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603216N / *Aviation Survivability*	Project (Number/Name) 0591 / *Acft Survivability, Vulnerability & Safety*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0591: *Acft Survivability, Vulnerability & Safety*	43.827	1.434	1.383	1.385	-	1.385	1.516	1.525	1.557	1.587	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Technology Requirements	0.090	0.181	0.035	0.000	0.035
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Planned trade studies include threats assessments, rotary wing survivability requirements, and vulnerability assessment of both fixed wing and rotary wing aircraft platforms.					
FY 2017 Plans: Planned trade studies include threats assessments, vulnerability assessments of both rotary wing and fixed wing aircraft, and updates to the Survivability Master Plan.					
FY 2018 Base Plans: Maintain a comprehensive Survivability Master Plan; assess technologies to identify survivability gaps as part of the OPNAV Aircraft Survivability Investment Strategy; mature survivability assessment processes; support rotary wing and fixed wing programmatic requirements for survivability studies, assessments, and analyses.					
FY 2018 OCO Plans: N/A					
Title: Technology Design & Development	0.990	0.944	1.298	0.000	1.298
Articles:	-	-	-	-	-
FY 2016 Accomplishments:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603216N / *Aviation Survivability*	**Project (Number/Name)** 0591 / *Acft Survivability, Vulnerability & Safety*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Assess technologies to address shortfalls identified as part of the OPNAV Aircraft Survivability Investment Strategy (OASIS) project. Establish an architecture to integrate Aviation Survivability Equipment (iASE) between USN/USMC aircraft platforms. ***FY 2017 Plans:*** Assess technologies to address shortfalls identified as part of the OASIS project. Establish an architecture to iASE between USN/USMC aircraft platforms. ***FY 2018 Base Plans:*** 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 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). ***FY 2018 OCO Plans:*** N/A					
Title: Technology Test & Evaluation	0.354	0.258	0.052	0.000	0.052
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Integration, laboratory and flight testing of prototype hardware in support of the iASE architecture development. Ballistic testing representative sample material against identified threats for incorporation into OASIS models. ***FY 2017 Plans:*** Integration, laboratory, and flight testing of prototype hardware in support of the iASE architecture development and in support of countermeasures simulation hardware. ***FY 2018 Base Plans:*** 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. ***FY 2018 OCO Plans:***					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603216N / *Aviation Survivability*	**Project (Number/Name)** 0591 / *Acft Survivability, Vulnerability & Safety*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A					
Accomplishments/Planned Programs Subtotals	1.434	1.383	1.385	0.000	1.385

C. Other Program Funding Summary ($ in Millions)

N/A

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-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603216N / *Aviation Survivability*	Project (Number/Name) 0592 / *Acft & Ordnance Safety*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0592: *Acft & Ordnance Safety*	34.434	1.043	0.907	1.060	-	1.060	1.067	1.062	1.085	1.108	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Insensitive Munitions (IM)	1.043	0.907	1.060	0.000	1.060
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Improve Air-to-Air Demonstration: Continue Sidewinder warhead/rocket motor technology risk reduction evaluation in support of PMA-259 planned block II+/III transition with high-level group high-performance motor, digital detection initiator, improved multi-layered case warhead design, and radio frequency cook-off sensor. Continue IM technology evaluation for metal matrix composite rocket motor IM demonstration in support of future Navy rocket transitions. Improve Air-Launched Weapons: Continue final IM testing/static fire of minimum smoke (MS) propellant demonstration of a cast/cure MS composite propellant that will meet -65 degree requirement for fixed-wing platforms in the current Hellfire configuration. Conduct IM evaluation of the Bomb Live Unit (BLU) 110 vented base plug redesign that failed during previous qualification testing. Advanced Containment/Case/Warhead Materials: Demonstrate IM performance of the Joint Multiple Effects Warhead System warhead with the redesigned fuze well on the follow-through bomb to enhance survivability during penetration. Initiate an IM evaluation of Mk 135 rocket motor with venting on Mk 14 container used in both shipping and storage of Tomahawk. Shock/Blast Barrier Protection Modeling, Demonstration, and Testing: Continue shape charge jet (SCJ) barrier evaluation/demonstration for SCJ mitigation in air-launched systems.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603216N / *Aviation Survivability*	**Project (Number/Name)** 0592 / *Acft & Ordnance Safety*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Advanced Energetic Materials: Evaluate a Joint Service Insensitive Munitions Technology Program (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).					
FY 2017 Plans: Improve Air-to-Air Demonstration: Continue Sidewinder warhead/rocket motor technology risk reduction evaluation in support of PMA-259 planned block III transition with highly-loaded-grain, high-performance motor, digital detonation initiator, improved multi-layered case warhead design, and radio frequency cook-off sensor. Evaluate metal matrix composite rocket motor for application into air to air/ground weapon systems. Improve Air-Launched Weapons: Continue Insensitive Munitions (IM) testing/static fire of minimum smoke propellant demonstration 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. Finalize IM evaluation of the Bomb Live Unit (BLU) 110 vented base plug redesign that failed during previous qualification testing and transition to PMA 201 for final qualification. Finalize evaluation of Highly-loaded-grain high performance rocket motor and application of Slow-cook-off-sensor technology in Advanced Anti-Radiation Guided Missile configuration for transition to PMA 242 Engineering, Manufacturing and Development (EMD). 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 EMD program. 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. Advanced Energetic Materials: Evaluate a Joint Service Insensitive Munitions Technology Program (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).					
FY 2018 Base 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					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603216N / *Aviation Survivability*	**Project (Number/Name)** 0592 / *Acft & Ordnance Safety*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
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 configuration for transition to PMA 242 AARGM BLK II 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 w/ advanced configurations that would potentially enhance both IM and operational performance. 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. Advanced Energetic Materials: Initiate evaluation of a Joint Service Insensitive Munitions Technology Program (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. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	1.043	0.907	1.060	0.000	1.060

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603216N / *Aviation Survivability*	**Project (Number/Name)** 0592 / *Acft & Ordnance Safety*

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-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603216N / *Aviation Survivability*	Project (Number/Name) 1819 / *CV Acft Fire Suppress System*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
1819: *CV Acft Fire Suppress System*	2.563	0.570	0.508	0.587	-	0.587	0.596	0.603	0.615	0.626	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Fire-Fighting	0.570	0.508	0.587	0.000	0.587
Articles:	-	-	-	-	-

FY 2016 Accomplishments:

Continue support for Naval Air Training and Operating Procedures Standardization improvements, and modeling and simulation for fire prediction. Complete the purple K efficiency based on particle size testing and industry assessment. Continue monitoring aqueous film forming foam developments and other clean agents. Continue to develop improved protocols for helicopter roll-over crashes, and evaluate equipment improvements for saws, spreaders, and other improvements. Evaluate flash-hood and crash-fire-rescue face shield improvements. Determine final requirements and business case for eye protection for metal and ordnance fires. 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. Evaluate and develop the protocols to mitigate the risks of mixed fuels on-board carriers. Prioritize highest payoff areas on carriers and other vessels that will lead to the development of automation systems to reduce manning.

FY 2017 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 develop improved protocols for helicopter roll-over crashes, and evaluate equipment improvements for saws, spreaders, and other improvements. 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

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603216N / *Aviation Survivability*	**Project (Number/Name)** 1819 / *CV Acft Fire Suppress System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
strike firefighting operations impacts. Start new project looking at firefighter issues related to unmanned air vehicle systems including composites, weapons and fuels. Conduct testing on new sensor and automation systems to improve firefighter response to weapons fires. ***FY 2018 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 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. 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. Develop procedures to be used aboard ship to rapidly and safely extinguished deep seated smoldering fires with composite materials. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.570	0.508	0.587	0.000	0.587

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-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603216N / *Aviation Survivability*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
9999: *Congressional Adds*	0.000	0.017	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	0.017
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

This congressional add is being moved to 0603261N for proper execution.

A. Mission Description and Budget Item Justification

In order for Navy UAS to meet mission needs, both national and international policies relating to airspace access and use by UAS need to continue to evolve. Navy efforts will focus on advancing future policies that will permit unfettered access to airspace for UAS. Additionally, advancements are needed in Detect and Avoid technology in the areas of sensors, algorithms, and the integration of the sensors, displays, and integration with the U.S.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017
Congressional Add: Unmanned System Integration	0.017	0.000
FY 2016 Accomplishments: Develop Integrated Separation Concepts, Airspace Integration Safety Case/ Assessment; Detect and Avoid and Fusion, Separation Algorithms, Safe and Efficient Terminal Airspace Surface Operations and Traffic/Airspace Information displays. Assess Availability/Quality of Surveillance Data, Human-Automation Interaction; and Predictability/Contingency Management.		
FY 2017 Plans: N/A		
Congressional Adds Subtotals	0.017	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Navy's efforts are in alignment with the most recent Department of Defense Report to Congress on The Progress of Research Activities to Advance Access of Unmanned Aircraft Systems to the National Airspace System - Jan 2015.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603237N *I Deployable JT Cmd & Control*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	230.849	3.051	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	233.900
3050: *Deployable JT Command and Control*	230.849	3.051	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	233.900

Note

Funding for FY17 and out has been moved from PE 0603237N to PE 0607700N as part of the PE consolidation effort.

A. Mission Description and Budget Item Justification

Deployable Joint Command and Control (DJC2) provides a self-contained, standardized, rapidly deployable, modular, scalable, and reconfigurable joint command and control (C2) capability to designated Geographic Combatant Commands (GCCs). DJC2 is the materiel solution to Defense Planning Guidance that called for the development of standing Joint Task Forces (JTFs) with a deployable C2 capability. DJC2 will ensure that Joint Force Commanders (JFC) are equipped, as well as trained and organized, to carry out their C2 responsibilities. DJC2 provides GCCs and JFCs a mission critical, integrated family of systems with which to plan, control, coordinate, execute, and assess operations. It is designed to deploy rapidly, set up within hours, and quickly provide necessary C2 mission and collaboration functionality across the full spectrum of JTF operations. The DJC2 has also been deployed in support of Humanitarian Assistance and Disaster Relief (HA/DR) efforts. The capability is intended for all levels of conflict and will be reconfigurable to meet specific GCC and JTF mission requirements. This capability is interoperable with higher and adjacent echelons of command (to include coalition allies) as well as with supporting elements to include joint forces.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	3.086	0.000	0.000	-	0.000
Current President's Budget	3.051	0.000	0.000	-	0.000
Total Adjustments	-0.035	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.035	0.000			
• Rate/Misc Adjustments	0.000	0.000	0.000	-	0.000

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603237N / *Deployable JT Cmd & Control*	Project (Number/Name) 3050 / *Deployable JT Command and Control*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3050: *Deployable JT Command and Control*	230.849	3.051	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	233.900
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Funding for FY17 and out has been moved from PE 0603237N to PE 0607700N as part of the PE consolidation effort.

A. Mission Description and Budget Item Justification

Deployable Joint Command and Control (DJC2) provides a self-contained, standardized, rapidly deployable, modular, scalable, and reconfigurable joint command and control (C2) capability to designated Geographic Combatant Commands (GCCs). DJC2 is the materiel solution to Defense Planning Guidance that called for the development of standing Joint Task Forces (JTFs) with a deployable C2 capability. DJC2 will ensure that Joint Force Commanders (JFC) are equipped, as well as trained and organized, to carry out their C2 responsibilities. DJC2 provides GCCs and JFCs a mission critical, integrated family of systems with which to plan, control, coordinate, execute, and assess operations. It is designed to deploy rapidly, set up within hours, and quickly provide necessary C2 mission and collaboration functionality across the full spectrum of JTF operations. The DJC2 has also been deployed in support of Humanitarian Assistance and Disaster Relief (HA/DR) efforts. The capability is intended for all levels of conflict and will be reconfigurable to meet specific GCC and JTF mission requirements. This capability is interoperable with higher and adjacent echelons of command (to include coalition allies) as well as with supporting elements to include joint forces. Note that DJC2 is not a follow-on or replacement system for the joint Global Command and Control Systems (GCCS); rather, DJC2 employs a GCCS in its suite of applications, ensuring interoperability with the worldwide-installed base of GCCS-J.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Systems Engineering & Integration	1.240	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Developed efforts of emerging cyber security technologies and new deployable capabilities to meet the warfighter needs.					
FY 2017 Plans: N/A					
FY 2018 Base Plans: N/A					
FY 2018 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603237N / *Deployable JT Cmd & Control*	**Project (Number/Name)** 3050 / *Deployable JT Command and Control*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A					
Title: DJC2 RDT&E Test Bed	1.811	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Developed, designed and integrated new information technology into the DJC2 in order to facilitate virtualization. Used DJC2 test bed for software testing and development of new capabilities.					
FY 2017 Plans: N/A					
FY 2018 Base Plans: N/A					
FY 2018 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	3.051	0.000	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• OPN /2804: *DJC2*	1.314	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	162.717
• OPN /2906: *DJC2*	0.000	1.414	2.973	-	2.973	2.277	2.228	2.277	2.322	Continuing	Continuing

Remarks

D. Acquisition Strategy

This RDT&E line supports an evolutionary acquisition strategy. The intent of this strategy is to: develop a system based upon a current understanding of joint requirements; rapidly field systems based upon those requirements; analyze operational utilization of the systems; and roll the results of the analysis into periodic upgrades of the systems to maintain currency and maximize operational effectiveness. The baseline configuration is based upon existing Command, Control, Communications, Computers, & Intelligence (C4I) systems, scaled to the Combatant Command level. The follow-on configurations will include newly developed capabilities based on emergent, joint requirements and operational feedback based upon utilization of earlier delivered systems.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603237N / *Deployable JT Cmd & Control*	**Project (Number/Name)** 3050 / *Deployable JT Command and Control*

E. Performance Metrics

The Deployable Joint Command and Control (DJC2) program continues to identify, evaluate and test a minimum of 3 - 5 new technologies per year based on emergent / joint requirements for potential insertion into the DJC2 system upgrade plan.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603251N *I (U)AIRCRAFT SYSTEMS*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	46.180	25.763	1.519	0.695	-	0.695	0.815	1.519	1.533	1.562	Continuing	Continuing
2777: *Highly Integrated Photonics (HIP)*	28.878	9.595	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	38.473
3331: *C-2 System Development*	17.302	1.686	1.519	0.695	-	0.695	0.815	1.519	1.533	1.562	Continuing	Continuing
9999: *Congressional Adds*	0.000	14.482	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	14.482

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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	26.643	1.519	0.717	-	0.717
Current President's Budget	25.763	1.519	0.695	-	0.695
Total Adjustments	-0.880	0.000	-0.022	-	-0.022
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.880	0.000			
• Program Adjustments	0.000	0.000	-0.001	-	-0.001
• Rate/Misc Adjustments	0.000	0.000	-0.021	-	-0.021

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2016	FY 2017
Project: 9999: *Congressional Adds*		
Congressional Add: *Highly Integrated Photonics (HIP) - Cong*	14.482	0.000

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603251N *I (U)AIRCRAFT SYSTEMS*

Congressional Add Details ($ in Millions, and Includes General Reductions)

	FY 2016	FY 2017
Congressional Add Subtotals for Project: 9999	14.482	0.000
Congressional Add Totals for all Projects	14.482	0.000

Change Summary Explanation

Technical: Not applicable.

Schedule: Not applicable.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603251N / *(U)AIRCRAFT SYSTEMS*	Project (Number/Name) 2777 / *Highly Integrated Photonics (HIP)*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2777: *Highly Integrated Photonics (HIP)*	28.878	9.595	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	38.473
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This program element supports the requirements study, technology maturation, system design and demonstration of a general-purpose, future-proof avionics network that replaces copper with glass. As both analog and digital onboard information transport and processing requirements continue to grow, life cycle costs associated with maintaining and upgrading current stove-piped networks aboard naval aircraft systems becomes unsustainable. The size, weight, power, high data rate and scalability advantages of a single-mode fiber optic network have significant total ownership cost savings implications that will allow the Department of the Navy to more affordably and effectively meet mission requirements well into the future. The activities funded will provide a networking baseline or standard that can be incorporated into airborne platforms that maximize networking system capability while minimizing associated life cycle costs. While the development under this program does specifically address airborne platforms where size and weight of the cable plant is particularly important, ultimately the network technology developed will have broad applicability to shipboard and submarine platform network requirements as well.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Highly Integrated Photonics Naval Networking	9.595	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: The overarching objective of this activity is to develop and demonstrate a highly integrated Local Area Network for airborne platforms incorporating an optical fiber network that uses wavelength division multiplexing (WDM) to address demanding military network re-configurability, scalability, and technology refresh challenges. The telecommunication network application of WDM technology is fully mature for commercial environments with little constraint on size, weight, and power (SWAP). The program will leverage and enhance the telecommunication standards for optical fiber networks while addressing the SWAP restrictions and severe environmental requirements of military airborne platforms. The functionality of the technology developed cannot be obtained through Commercial-Off-The-Shelf components due to SWAP constraints and the military environment. Effort will involve understanding the properties of engineered optical fiber components and electronic semiconductors as they apply to highly integrated optical fiber networks. Ultimately these higher performance components and networks will address the needs for all classes of military platforms.					
FY 2016 Accomplishments:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603251N / *(U)AIRCRAFT SYSTEMS*	**Project (Number/Name)** 2777 / *Highly Integrated Photonics (HIP)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Continue development and testing of components for Technology Readiness Level Six assessment in aircraft System Integration Lab environments. Begin initial flight testing of links to establish readiness for transition to platform/systems applications at acceptable risks. ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	9.595	0.000	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Highly Integrated Photonics Naval Networking strategy began as a joint effort with Defense Advanced Research Projects Agency for development and demonstration of Analog and Digital Wavelength Division Multiplex Highly Integrated Photonics for aviation applications with the focus being a future technology refresh for the F-35 and, as an enterprise level technology, other applications. Funding extends the development and technology maturation to a technology/manufacturing readiness level compatible with transition to one, or more, Program(s) of Record.

E. Performance Metrics

Performance that adheres to the conventional Wavelength Division Multiplex optical network protocol standards, wavelengths and interface with Ethernet 10Gbit/s, MIL-STD-1553, and other protocols running concurrently on one or more single-mode fibers along with analog signals. Each critical component has a set of physical, environmental, and operational requirements driven by representative platform, systems, and operational metrics. Includes testing in a Systems/Software Integration Laboratory and in test aircraft.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603251N / *(U)AIRCRAFT SYSTEMS*	Project (Number/Name) 3331 / *C-2 System Development*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3331: *C-2 System Development*	17.302	1.686	1.519	0.695	-	0.695	0.815	1.519	1.533	1.562	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Combat Readiness	1.686	1.519	0.695	0.000	0.695
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 2016 Accomplishments: Funding is for development and design for C-2 combat readiness.					
FY 2017 Plans: Funding provides for the continuation of C-2 combat readiness design, development and test. Studies and analysis of C-2A Hydraulic Systems.					
FY 2018 Base Plans: Continuation of C-2A subsystems studies and analysis.					
FY 2018 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	1.686	1.519	0.695	0.000	0.695

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603251N / *(U)AIRCRAFT SYSTEMS*	**Project (Number/Name)** 3331 / *C-2 System Development*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• APN/0556: *C-2A Series*	7.099	19.066	18.673	-	18.673	17.809	18.118	13.680	0.000	22.396	573.973

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 scheduled for 3Q FY17. C-2A Hydraulic Systems studies and analysis final report is planned for 4Q FY17.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603251N / *(U)AIRCRAFT SYSTEMS*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
9999: *Congressional Adds*	0.000	14.482	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	14.482
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

N/A

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017
Congressional Add: Highly Integrated Photonics (HIP) - Cong	14.482	0.000
FY 2016 Accomplishments: Develop and test integrated photonic components for modernizing DOD aircraft (and other platform) avionics, sensors, and electronic warfare systems.		
FY 2017 Plans: N/A		
Congressional Adds Subtotals	14.482	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603254N *I ASW Systems Development*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	132.499	5.455	7.041	7.661	-	7.661	7.189	7.309	7.465	7.613	Continuing	Continuing
1292: *Adv ASW Sensors & Proc*	118.285	3.610	7.041	7.661	-	7.661	7.189	7.309	7.465	7.613	Continuing	Continuing
3222: *Advanced High Altitude ASW*	14.214	1.845	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	16.059

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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	5.551	7.041	7.746	-	7.746
Current President's Budget	5.455	7.041	7.661	-	7.661
Total Adjustments	-0.096	0.000	-0.085	-	-0.085
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.001	0.000			
• SBIR/STTR Transfer	-0.094	0.000			
• Program Adjustments	0.000	0.000	-0.012	-	-0.012
• Rate/Misc Adjustments	-0.001	0.000	-0.073	-	-0.073

Change Summary Explanation

Technical: Not applicable.

Schedule:

1292. Received administrative adjustment starting in FY17. Project Units H3222 and H1292 were consolidated into H1292.

3222. Received administrative adjustment starting in FY17. Project Units H3222 and H1292 were consolidated into H1292.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603254N / *ASW Systems Development*	Project (Number/Name) 1292 / *Adv ASW Sensors & Proc*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
1292: *Adv ASW Sensors & Proc*	118.285	3.610	7.041	7.661	-	7.661	7.189	7.309	7.465	7.613	Continuing	Continuing
Quantity of RDT&E Articles		100	100	100	-	100	-	-	-	-		

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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: System performance assessments	3.610	7.041	7.661	0.000	7.661
Articles:	100	100	100	-	100
FY 2016 Accomplishments: Conducted system performance assessments for Multi-Static Active Coherent ASW algorithms and other prospective Acoustic and Non-Acoustic sensors, systems and enhancements. The test articles, which consist of passive/active sensors/components and associated processors, supported at-sea trials and experimentation. Developed prototype signal processing for use in at-sea experiment/exercise participation and data collection. Conducted data analysis and algorithm assessments for the engineering measurement program on Science and Technology, Research and Development and operational fleet collected data.					
FY 2017 Plans: Received technical adjustment starting in FY17. Project Units H3222 and H1292 are consolidated into H1292. Conduct studies, analyses and system performance assessments on next generation Multi-Static Active Coherent ASW developments and other Acoustic and Non-Acoustic system enhancements for traditional and					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603254N / *ASW Systems Development*	**Project (Number/Name)** 1292 / *Adv ASW Sensors & Proc*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
high altitude ASW operations. The test articles, which consist of passive/active sensors/components, processors and algorithms, will support at-sea trials and experimentation. Develop and mature prototype software for use in at-sea experiment/exercise participation and data collection. Conduct data analysis for the engineering measurement program on Science and Technology, Research and Development and operational fleet collected data. ***FY 2018 Base Plans:*** 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 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	3.610	7.041	7.661	0.000	7.661

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• RDT&E/0480: *ASW Sensors & Proc*	22.053	29.967	33.409	-	33.409	25.012	43.856	44.783	45.672	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-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603254N / *ASW Systems Development*	Project (Number/Name) 3222 / *Advanced High Altitude ASW*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3222: *Advanced High Altitude ASW*	14.214	1.845	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	16.059
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Received administrative adjustment starting in FY17. Project Units H3222 and H1292 were consolidated into H1292.

A. Mission Description and Budget Item Justification

Advanced High Altitude Anti-Submarine Warfare (Adv HAASW) program performs research, analyses, and early prototype demonstration activities for new technologies to support future Air Anti-Submarine Warfare (ASW) programs for P-8A and other platforms. Emphasis is placed on evaluation of technologies and prototype systems in realistic operating environments with a focus on new sensors and system components.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Research, analyses, and early prototype demonstration activities	1.845	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Performed studies, analyses and early prototyping of acoustic, non-acoustic and communications technologies suitable for high altitude ASW operations.					
FY 2017 Plans: N/A					
FY 2018 Base Plans: N/A					
FY 2018 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	1.845	0.000	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603254N / *ASW Systems Development*	**Project (Number/Name)** 3222 / *Advanced High Altitude ASW*

D. Acquisition Strategy

Develop modifications to incorporate capability into current sonobuoy sensors and integration into Air ASW platforms, P-8A as the lead aircraft.

E. Performance Metrics

Perform Studies and Analysis to better define Advanced HAASW program needs. Early prototypes will be developed to reduce risk for ASW operations at high altitudes by the P-8A aircraft.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603261N *I Tactical Airborne Reconnaissance*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	69.871	8.391	3.274	3.707	-	3.707	3.635	3.610	3.683	3.756	Continuing	Continuing
2467: *UAV Conops*	69.871	3.080	3.274	3.707	-	3.707	3.635	3.610	3.683	3.756	Continuing	Continuing
9999: *Congressional Adds*	0.000	5.311	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	5.311

A. Mission Description and Budget Item Justification

This program element funds efforts to develop Concept of Operations in support of the Navy's overall Unmanned Aircraft Systems (UAS) Strategy integrating UAS into the Chief of Naval Operations Navy Vision of Sea Power 21 (Sea Shield, Sea Strike, Sea Basing and FORCEnet).

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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	3.080	3.274	3.675	-	3.675
Current President's Budget	8.391	3.274	3.707	-	3.707
Total Adjustments	5.311	0.000	0.032	-	0.032
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Rate/Misc Adjustments	0.000	0.000	0.032	-	0.032
• Congressional Add Adjustments	5.311	-	-	-	-

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2016	FY 2017
Project: 9999: *Congressional Adds*		
Congressional Add: *Unmanned System Integration*	5.311	0.000
Congressional Add Subtotals for Project: 9999	5.311	0.000
Congressional Add Totals for all Projects	5.311	0.000

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603261N *I Tactical Airborne Reconnaissance*

Change Summary Explanation

Technical: Not applicable to baseline.

Schedule: Not applicable.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603261N / *Tactical Airborne Reconnaissance*	Project (Number/Name) 2467 / *UAV Conops*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2467: *UAV Conops*	69.871	3.080	3.274	3.707	-	3.707	3.635	3.610	3.683	3.756	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 tactical, persistent and penetrating Intelligence, Surveillance, and Reconnaissance in support of Naval and Joint missions from forward bases/platforms and naval ships.

In support of the Navy's overall UAS strategy, this program develops Concept of Operations (CONOPS) that integrate UAS into the Chief of Naval Operations Navy Vision of Sea Power 21 (Sea Shield, Sea Strike, Sea Basing and FORCEnet). By providing fleet input based on current operations with UAS in a simulated combat environment, this CONOPS development investment is the foundation of how the Carrier Strike Group and the Expeditionary Strike Group will operate a combined Manned and Unmanned Naval Air Force. This program establishes the common architecture, including Command & Control, for all unmanned systems to support and inform CONOPS development. This effort provides for a cross-program view of Naval Unmanned Systems and is the entry point for Office of the Secretary of the Defense (OSD) and other services for commonality and interoperability. Specifically:
- Provides studies and demonstrations in support of the Naval UAS Family of Systems (FoS) CONOPS development.
- Horizontally integrates across the Naval UAS FoS for the Naval Aviation Enterprise through interoperability and common system solutions.
- Develops the Naval UAS FoS Architecture to support integration into the Integrated Warfighter Capability Process.
- Provides Naval support for development of Standards across Department of Defense (DoD) UAS and North Atlantic Treaty Organization, emphasizing standardization and interoperability.
- 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Studies and Demonstrations	1.523	1.666	1.760	0.000	1.760
Articles:	-	-	-	-	-
Description: Studies and demonstrations to develop CONOPS for manned-unmanned integration of UAS and aircraft systems. Build a UAS simulation environment for Modeling and Simulation of common UAS components in representative battlespace architectures.					
FY 2016 Accomplishments: Conducted a Trident Warrior 16 Fleet exercise to demonstrate Fleet Concept of Operations and Manned/ Unmanned interoperability. Specifically the real-time flow of Visual Information from tactical to enterprise					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603261N / *Tactical Airborne Reconnaissance*	**Project (Number/Name)** 2467 / *UAV Conops*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
users using the GEOINT UNIFIED NAVAL STREAMING SYSTEM (GUNSS). Continued development of the Unmanned Aircraft Systems (UAS) modeling and simulation of Fleet Concept of Operations scenarios. Continued to Demonstrate Manned/Unmanned Interoperability. Provided government engineering support, program office travel, and contract support services. ***FY 2017 Plans:*** Continue development of the Unmanned Aircraft Systems (UAS) modeling and simulation of Fleet Concept of Operations scenarios. Demonstrate Manned/Unmanned Interoperability. Provide government engineering support, program office travel, and contract support services. ***FY 2018 Base Plans:*** Continue development of the Unmanned Aircraft Systems (UAS) modeling and simulation of Fleet Concept of Operations scenarios. Demonstrate Manned/Unmanned Interoperability. Provide government engineering support, program office travel, and contract support services. ***FY 2018 OCO Plans:*** N/A					
Title: Naval Interoperability & Standardization	1.557	1.608	1.947	0.000	1.947
Articles:	-	-	-	-	-
Description: Increase Naval Unmanned Systems interoperability emphasizing Naval, Joint Service, and international standardization. ***FY 2016 Accomplishments:*** Developed and released the following Unmanned Systems Interoperability Profiles and Navy implementation conventions: Advanced Command and Control, Navy Wide Area Network, and Standard Command and Control. Continued to Support OSD Joint Service and NATO coalition interoperability efforts. Provided government engineering support, program office travel, and contract support services. ***FY 2017 Plans:*** Continue to develop Unmanned Systems Naval Interoperability Profiles in support of Integrated Warfare Capability Packages. Support OSD Joint Service and NATO coalition interoperability efforts. Provide government engineering support, program office travel, and contract support services. ***FY 2018 Base Plans:***					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603261N / *Tactical Airborne Reconnaissance*	**Project (Number/Name)** 2467 / *UAV Conops*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Continue to develop Unmanned Systems Naval Interoperability Profiles in support of Integrated Warfare Capability Packages. Support OSD Joint Service and NATO coalition interoperability efforts. Provide government engineering support, program office travel, and contract support services. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	3.080	3.274	3.707	0.000	3.707

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

The program office will leverage existing Government facilities (e.g., Joint Technology Center/System Integration Laboratory and Naval Unmanned Aircraft Systems (UAS) Program of Record assets as available) to develop and demonstrate Naval UAS Concept of Operations. Government engineering support will be used for Standards Development, Architectural Analysis, Modeling and Simulation efforts and testing.

E. Performance Metrics

UAS operations and interoperability for systems delivered to the warfighter are continually improved upon increasing the level of integration, standardization and effective employment in maritime battle space dominance.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603261N / *Tactical Airborne Reconnaissance*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
9999: *Congressional Adds*	0.000	5.311	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	5.311
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 tactical, persistent and penetrating Intelligence, Surveillance, and Reconnaissance in support of Naval and Joint missions from forward bases/platforms and naval ships.

In support of the Navy's overall UAS strategy, this program develops Concept of Operations (CONOPS) that integrate UAS into the Chief of Naval Operations Navy Vision of Sea Power 21 (Sea Shield, Sea Strike, Sea Basing and FORCEnet). By providing fleet input based on current operations with UAS in a simulated combat environment, this CONOPS development investment is the foundation of how the Carrier Strike Group and the Expeditionary Strike Group will operate a combined Manned and Unmanned Naval Air Force. This program establishes the common architecture, including Command & Control, for all unmanned systems to support and inform CONOPS development. This effort provides for a cross-program view of Naval Unmanned Systems and is the entry point for Office of the Secretary of the Defense (OSD) and other services for commonality and interoperability. Specifically:
- Provides studies and demonstrations in support of the Naval UAS Family of Systems (FoS) CONOPS development.
- Horizontally integrates across the Naval UAS FoS for the Naval Aviation Enterprise through interoperability and common system solutions.
- Develops the Naval UAS FoS Architecture to support integration into the Integrated Warfighter Capability Process.
- Provides Naval support for development of Standards across Department of Defense (DoD) UAS and North Atlantic Treaty Organization, emphasizing standardization and interoperability.
- 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)	FY 2016	FY 2017
Congressional Add: Unmanned System Integration	5.311	0.000
FY 2016 Accomplishments: Develop and document an Airspace Integration Architecture that will include all sizes of UAS and all types of airspace volumes which will establish a common architecture that can be used to validate UAS airspace access CONOPS and facilitate the development of performance standards for sense and avoid capabilities for a given platform operating in a given environment. Build an environment to host the airspace integration architecture.		

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603261N / *Tactical Airborne Reconnaissance*	**Project (Number/Name)** 9999 / *Congressional Adds*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017
Conduct an assessment of the performance required form technologies that could be incorporated into small UAS to enable a certifiable sense and avoid (SAA) capability. ***FY 2017 Plans:*** Develop Integrated Separation Concepts, Airspace Integration Safety Case/Assessment; DAA and Fusion, Separation Algorithms, Safe and Efficient Terminal Airspace Surface Operations and Traffic/ Airspace Information displays. Assess Availability/Quality of Surveillance Data, Human-Automation Interaction; and Predictability/Contingency Management.		
Congressional Adds Subtotals	5.311	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603382N *I Advanced Combat Systems Tech*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	65.665	1.572	57.034	61.381	-	61.381	65.946	61.266	65.645	68.400	Continuing	Continuing
0324: *Adv Combat System Technology*	65.665	1.572	1.651	1.869	-	1.869	1.855	1.842	1.879	1.917	Continuing	Continuing
0385: *Rapid Prototype Development*	0.000	0.000	40.356	25.876	-	25.876	30.219	36.567	42.386	42.792	Continuing	Continuing
0399: *Unmanned Rapid Prototype Development*	0.000	0.000	15.027	15.361	-	15.361	15.347	15.357	15.380	15.691	Continuing	Continuing
3422: *SHARC Surface Platform*	0.000	0.000	0.000	6.775	-	6.775	7.025	0.500	0.000	0.000	0.000	14.300
3423: *LOCUST*	0.000	0.000	0.000	3.500	-	3.500	3.500	3.000	6.000	8.000	Continuing	Continuing
3424: *Heterogeneous Collaborative Unmanned Systems (HCUS)*	0.000	0.000	0.000	8.000	-	8.000	8.000	4.000	0.000	0.000	0.000	20.000

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 was new in FY17 and addresses the advancement and transition of combat system technologies. It supports the goals and objectives of the Chief of Naval Operations (CNO) Navigation Plan, Commandant of the Marine Corps (CMC) Planning Guidance, and the Cooperative Strategy for 21st Century Seapower. This project also supports the Secretary of the Navy's (SECNAV) Innovation Vision and the Implementation Directive for Better Buying Power 3.0. These efforts will reinvigorate and increase the use of prototyping and experimentation to rapidly field new warfighting capabilities, concepts and technologies, and engineering solutions. In some cases these efforts may be identified for acceleration in accordance with SECNAV and CNO guidance for Accelerated Acquisition. With an emphasis on rapid prototyping of mature technologies the project is intended to expedite the development, exploration and fielding of combat system innovations in six warfighting domains: surface warfare, air warfare, undersea warfare, expeditionary warfare, information dominance and special operations warfare. Prototype development efforts will be used to develop/refine Concepts of Operation (CONOPS) and operational requirements; evaluate the operational utility and technical feasibility of technology/engineering innovations; support limited fielding of prototypes; and mitigate cost, schedule and performance risks associated with follow-on acquisition programs.

Project Unit 0399: The Unmanned Rapid Prototype Development project was new in FY17 and was created to implement the SECNAVs emphasis on unmanned warfare systems and addresses the advancement and transition of naval warfare systems technology. This project funds unmanned system (UxS) rapid development technology initiatives based on Navy warfighting needs and capability gaps. This project supports the goals and objectives of the CNO Navigation Plan and the Cooperative Strategy for 21st Century Seapower. Additionally, this project supports the SECNAVs Innovation Vision and the Implementation Directive for Better Buying Power 3.0. In some cases these efforts may be identified for acceleration in accordance with SECNAV and CNO guidance for Accelerated Acquisition. With an emphasis on rapid prototyping of mature UxS technologies the project is intended to expedite the development, exploration and Fleet introduction of unmanned capabilities in the warfare areas of Surface, Air, Anti-Submarine, and Expeditionary Warfare, Information Dominance and Special Operations Warfare. The project will provide the Navy and Marine Corps with technical and operational utility assessments of technology/engineering innovations; ability to refine operational requirements and concepts of operation; support limited fielding of prototypes; and mitigate cost, schedule and performance risk associated with follow-on acquisition programs.

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.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603382N *I Advanced Combat Systems Tech*

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.

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. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	1.631	57.034	57.592	-	57.592
Current President's Budget	1.572	57.034	61.381	-	61.381
Total Adjustments	-0.059	0.000	3.789	-	3.789
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.059	0.000			
• Program Adjustments	0.000	0.000	3.033	-	3.033
• Rate/Misc Adjustments	0.000	0.000	0.756	-	0.756

Change Summary Explanation

The FY 2017 funding request was reduced by -$0.124 million to account for the availability of prior year execution balances.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603382N / *Advanced Combat Systems Tech*	Project (Number/Name) 0324 / *Adv Combat System Technology*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0324: *Adv Combat System Technology*	65.665	1.572	1.651	1.869	-	1.869	1.855	1.842	1.879	1.917	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 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, Experimentation and Demonstration (RPED) 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.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Align the Naval Enterprise Across All Domains to Implement OA	1.000	1.030	0.631	0.000	0.631
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Continued to coordinate and develop the quarterly OA Report to Congress, annual budget submission and financial reporting for this project. Implement Enterprise architecture of modular development and maximum reuse. Promote tailor-able open standards relative to Technical Reference Frameworks attributes.					
FY 2017 Plans: Continue FY16 Plan in addition to:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603382N / *Advanced Combat Systems Tech*	**Project (Number/Name)** 0324 / *Adv Combat System Technology*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Extending technical, business and cultural transition to increase OSA Adoption to RPED projects and programs of record. ***FY 2018 Base Plans:*** Continue FY2017 Plan in addition to: 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 2018 OCO Plans:*** N/A					
Title: Change the Naval and Marine Corps Cultures to Institutionalize OA Principle	0.192	0.217	0.624	0.000	0.624
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Continued with direct engagement with programs to improve OA principles and practices through stakeholder management, communications, mentoring, training, and curriculum adjustment. Established and maintained communication and transparency across programs to highlight new opportunities for enterprise product reuse and improved interoperability. Sustained a strong message to the public and industry on the value of OA for cost-effective management of the acquisition portfolio. Adjust funding techniques for cross-Enterprise co-development. Identify best practices and collaborative forums to increase the likelihood of transitioning maturing technology into programs of record. ***FY 2017 Plans:*** Continue with FY2016 Plan in addition to: 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 2018 Base Plans:*** Continue FY2017 Plan in addition to: 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 2018 OCO Plans:***					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603382N / *Advanced Combat Systems Tech*	**Project (Number/Name)** 0324 / *Adv Combat System Technology*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A					
Title: OA Systems Engineering Leadership	0.161	0.166	0.225	0.000	0.225
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Continued transition of programs to fully utilize the principles and practices of OA in accordance with the ASN(RDA) approved Naval OSA Strategy of November 2012. Continued collaboration and cooperation incentives, and improved techniques for finding and using modular capabilities. Adjust incentives for collaboration and cooperation between programs. Establish reward mechanisms for programs and personnel successful in achieving OSA implementations that rapidly integrate innovation and lower total ownership costs.					
FY 2017 Plans: Continue with FY2016 Plan in addition to: Sponsor Communities of Interest to support cooperation between programs					
FY 2018 Base Plans: Continue FY2017 Plan in addition to: Sponsor Communities of Interest to support cooperation between programs					
FY 2018 OCO Plans: N/A					
Title: Knowledge Products for Implementing OSA	0.219	0.238	0.389	0.000	0.389
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Continued effort to evolved the Program Managers OSA Workbook and other associated knowledge products to position Naval Programs to take advantage of consistent business and technical practices. Continued collaboration forums so that best practices can be shared so that the OA related knowledge products are kept up to date with the latest innovations being used in program execution. This included working with outside organizations such as DISA's Forge.mil as well as the Navy's NSERC/NARS environments. Continued work to ensure that DAU is addressing training on OSA as directed to them under the Better Buying Power implementation memo that assigns DASN RDT&E the lead for providing baseline information for curriculum development. Continued to develop new training on OA, including deployment of Naval unique training on OA					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603382N / *Advanced Combat Systems Tech*	**Project (Number/Name)** 0324 / *Adv Combat System Technology*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
throughout the SYSCOMs and PEOs. Minimized DAU courses to fill needed knowledge gaps. Established an OSA mentoring program for acquisition professionals. ***FY 2017 Plans:*** Continue with FY2016 Plan in addition to: Work with the Naval Laboratories to establish OSA as the default method for creating prototypes ***FY 2018 Base Plans:*** Continue with FY2017 Plan in addition to: Work with the Naval Laboratories to establish OSA as the default method for creating prototypes ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	1.572	1.651	1.869	0.000	1.869

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 cultural environment for warfare systems acquisition to improve cost, increase access to innovation, and reduce time to field. 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.

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-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603382N / *Advanced Combat Systems Tech*	Project (Number/Name) 0385 / *Rapid Prototype Development*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0385: *Rapid Prototype Development*	0.000	0.000	40.356	25.876	-	25.876	30.219	36.567	42.386	42.792	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

This project was new in FY2017. Beginning in FY17, funding for the CNO Rapid Innovation Cell (CRIC) (Project 2140) was realigned from PE 0604707N Space and Electronic Warfare (SEW) Architecture/Eng, as well as funding from the Rapid Technology Transition (RTT) program from PE 0203761N to support rapid prototype development in support of the CNO's Design for Maintaining Superiority strategy and lines of effort that focus on warfighting and learning faster.

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. The Rapid Prototype Development project supports the goals and objectives of the Chief of Naval Operations (CNO) Navigation Plan and Design for Maintaining Maritime Superiority, Commandant of the Marine Corps (CMC) Planning Guidance, and the Cooperative Strategy for 21st Century Seapower, and 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. This project would target, among other sources, technologies maturing out of ONR's Leap Ahead portfolio as well as technologies maturing out of other S&T venues. 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. Prototype development efforts will be used to inform/refine Concepts of Operation (CONOPS) and operational requirements; evaluate the operational utility and technical feasibility of technology/engineering innovations; support limited fielding of prototypes; and mitigate cost, schedule and performance risks associated with follow-on acquisition programs.

In support of the Fleet Forces Command, Naval Warfighting Development Centers, Naval Warfare Development Command, and the Marine Corps Combat Development and Integration Command, this project will leverage the scientific and engineering expertise and technical infrastructure within the Naval Research and Development Establishment (NR&DE) to produce sensor, weapon system, and command, control, and communications prototypes to address naval warfighting needs and pursue future naval warfighting concepts.

Additionally, new and emerging technologies and engineering innovations that offer the potential to reduce cost, increase readiness, or improve the overall efficiency or effectiveness of naval forces will be explored. A key distinction is that the process and battle rhythm is designed for optimal responsiveness to Fleet needs.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603382N / *Advanced Combat Systems Tech*	**Project (Number/Name)** 0385 / *Rapid Prototype Development*

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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Rapid Prototype Development, Experimentation and Demonstration	0.000	40.356	25.876	0.000	25.876
Articles:	-	-	-	-	-

Description: Technologies, innovations, and threats continually emerge and require rapid response. Pre-set, yearly, or even quarterly proposal/review cycles are not sufficiently responsive to the dynamic nature of cutting-edge technological breakthroughs, engineering innovations, new operational concepts, and/or emerging threats. Rapid prototyping and demonstration addresses this issue by:

- improving alignment across Fleet and Marine Corps forces, Requirements, Budgeting, and Research & Development organizations to prioritize initiatives and streamline management and execution of rapid prototyping and experimentation,
- allowing the DON to "learn fast" through prototyping - completing projects as rapidly as possible to improve follow-on system acquisition decisions before incurring significant costs,
- unleashing the intrinsic ingenuity of the Navy's Science and Technology (S&T) community, the NR&DE, and our talented Sailors and Marines.

In response to Fleet needs, rapid prototyping and demonstration will identify and select prototyping initiatives based on direct and continuous Fleet engagements. Integrated teams consisting of scientists and engineers from across the NR&DE are promptly deployed to interact with Fleet Commands, the Navy Warfare Development Command, and Warfighting Development Centers. The rapid prototyping and demonstration approach considers maturing S&T technologies and engineering innovations produced through Future Naval Capabilities, Innovative Naval Prototypes, Naval Innovative Science and Engineering (NISE) Section 219, Emerging Capabilities and Prototypes, and commercial technologies as potential prototypes. Direct and continuous interactions between our scientists and engineers and the operators they support will drive innovation and, more importantly, align technical ideas with operational needs at the earliest stages in prototype development.

Prototypes are used to refine operational concepts and requirements through experimentation campaigns making maximum use of tools, ranges, and test facilities readily available within our NR&DE and Fleet

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603382N / *Advanced Combat Systems Tech*	**Project (Number/Name)** 0385 / *Rapid Prototype Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total

experimentation venues. Prototypes will be demonstrated in operationally relevant environments on an accelerated timeline. Deliverables include actual integrated hardware/software prototype system(s) and experimentation events, CONOPS, requirements analysis, test report(s), and technical data package(s) to support experimentation events, limited fielding decisions, and to inform leadership decisions on the development of an acquisition program.

FY 2016 Accomplishments:
N/A

FY 2017 Plans:
The rapid prototyping and demonstration process is iterative and responsive to warfighting needs, capability gaps, naval priorities, and technology opportunities. The FY18 execution plan will draw upon the focus areas, projects and plans outlined below and are based on USFF prioritized warfighting needs, assessments of emerging technology, and as informed by recent analysis, wargames and other experimentation results. The project focus areas reflect the Navy's strategic shift in national security to the Asia-Pacific Theater, and also address the requirement to continue to reduce lifecycle costs across all systems. The FY 2018 rapid development cycle execution plan will select promising technologies for rapid prototype and demonstration consistent with the focus areas.

1. Electromagnetic Maneuver Warfare
Electromagnetic Maneuver Warfare (EMW) is the Navy and Marine Corps warfighting approach to gain decisive military advantage in the electromagnetic spectrum, to enable freedom of action across all naval mission areas. Advanced
components and prototypes will demonstrate multi-spectral sensors; passive detection, tracking, and targeting systems; real
time spectrum awareness; robust, resilient circuits, transceivers, links; electronic protection; emissions management; spread
spectrum techniques; deception and decoys; electronic attack (including directed energy); networked sensors and weapon
systems; battle management aids; or cyber situational awareness, security, and operations.
1.1 Battlespace Awareness
Emerging technology and engineering innovations from Naval/DoD research and development, industry, and academia

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603382N / *Advanced Combat Systems Tech*	**Project (Number/Name)** 0385 / *Rapid Prototype Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
will be integrated to demonstrate intelligence, surveillance, reconnaissance (ISR), and targeting support. Advanced sensing capabilities (ship-, airborne-, and ground-based; multi-, hyper-spectral, and other) capable of long-range sensing and discrimination are required to understand electromagnetic emissions and ultimately produce fire control quality data. This work will explore the warfighting utilization of emerging naval innovations such as Tactical Nighttime Wide-Area Surveillance, Ultra Wide Field Of View (FOV) Area Surveillance, and others. - Survey naval research and development, industry and academia sources for emerging sensors and processing capabilities. - Conduct trade studies to support CONOPS refinement. - Develop prototypes and perform sub-system and integration testing. - Conduct experiments at naval labs and test ranges. - Assess technical performance and operational utility at focused events such as Rim of the Pacific Exercise (RIMPAC) 2018. - Develop objectives for follow-on Fleet experiments that include alternative technologies, more robust capabilities, or alternative employment scenarios. - Assess and support INP and other emerging technologies for transition to acquisition through prototyping and experimentation. 1.2 Naval Tactical Data Links and Networks Emerging technology and engineering innovations from Naval/DoD research and development, industry, and academia will be integrated to demonstrate secure, reliable, collection, analysis, and fusion of ISR and targeting data from organic assets and sensors. This work will explore the warfighting utilization of emerging naval and industry innovations, to include INPs , such as multiple, simultaneous, wideband data links, for signal and imagery data transmission between organic assets					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603382N / *Advanced Combat Systems Tech*	**Project (Number/Name)** 0385 / *Rapid Prototype Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
and Battle Group level processing systems. Technologies with the potential to provide Unit-level access to ISR data will be submitted to the Fleet for experimentation. Project will integrate mature technologies developed through naval investments in the areas of low probability of intercept and detection techniques, high data rate, long-range, multi-band and wideband links, networked and software defined modes, and encryption and signal processing technologies, as well as various Nemesis modules. - Conduct requirements analysis in support of CONOPS refinement. - Complete design and demonstration objective reviews. - Perform sub-system and integration testing. - Conduct experiments in a simulated maritime relevant environment. - Assess technical performance and operational utility. - Submit to Fleet experimentation venues such as the Naval Tactical Data Network at-sea experiment. - Assess technical performance and operational utility. - Develop objectives for follow-on experiments that include alternative technologies, more robust capabilities, or alternative employment scenarios. - Assess and support INP and other emerging technologies for transition to acquisition through prototyping and experimentation. 1.3 Counter ISR and Targeting Emerging technology and engineering innovations from Naval/DoD research and development, industry, and academia will be integrated to demonstrate directed energy and other prototype systems to counter enemy ISR and targeting systems, conduct electronic attack, and deploy jammers and decoys. . This work will explore the warfighting utilization of emerging naval and industry innovations, such as High Power Radio Frequency Counter-UAS, Tactical EO-IE-SIGINT Integrated for Targeting, various Nemesis modules as well as other prototypes which, due to the nature of those projects, specific					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603382N / *Advanced Combat Systems Tech*	**Project (Number/Name)** 0385 / *Rapid Prototype Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
applications and detailed plans are available at a higher classification level. - Technical assessment of emerging sensors, systems, and processing capabilities. - Participate and provide technical inputs to planned naval tabletop workshops, mission planning events, and wargames such as those planned in support of the Naval Integrated Fires Campaign. - Complete design and demonstration objective reviews. - Perform sub-system and integration testing. - Conduct experiments against threat surrogates in a maritime relevant environment. - Assess technical performance and operational utility. - Develop objectives for follow-on wargames and Trident Warrior/Rim of the Pacific (RIMPAC 2018). - Assess and support INP and other emerging technologies for transition to acquisition through prototyping and experimentation. 1.4 Data Fusion and Tactical Decision Aid Emerging technology and engineering innovations from Naval/DoD research and development, industry, and academia will be integrated to demonstrate automated data-fusion engines and networked tactical decision aids which leverage networked sensors, radars, combat systems, and weapons to overcome single-platform limitations. This work will explore the warfighting utilization of emerging naval and industry innovations, to include INPs, autonomous data fusion and processing modules, various Nemesis modules, as well as other prototypes. - Conduct requirements analysis in support of CONOPS refinement. - Complete demonstration objective reviews. - Software development and integration testing. - Conduct experiments in a simulated maritime relevant environment. - Assess technical performance and operational utility. - Human System Interface (HSI) assessments. - Develop objectives for follow-on experiments that include alternative technologies, more robust capabilities, or alternative employment scenarios. - Assess and support INP and other emerging technologies for transition to acquisition through prototyping and					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
experimentation. 2. Undersea Dominance Undersea Dominance is focused on developing advanced components and prototypes to compliment the submarine force with affordable fixed and mobile arrays, distributed netted sensors, autonomous systems, and advanced payloads. Technologies with the potential to close anti-submarine warfare and mine warfare warfighting gaps will be submitted to the undersea dominance operating concept and mine warfare at-sea experiments. 2.1 Advanced Payloads and Sensors Emerging technology and engineering innovations from Naval/DoD research and development, industry, and academia will be integrated to demonstrate advanced payloads and sensors to support anti-submarine and mine warfare missions. This work will explore the warfighting utilization of emerging naval and industry innovations such as Remote Aerial Sonar and Communications Acoustic Laser System, Acoustic Communications modules that enable collaborative mission execution between distributed systems such as the heavy weight torpedo, Compact Rapid Attack Weapon, and Compact Modular Sensor and processing Suite as well as other projects which due to their nature, specific applications and detailed plans are available at a higher classification level. - Update requirements and CONOPS based on emerging technology and experimentation results - Conduct delta-design and delta-demonstration objective reviews - Perform acoustic sub-system and integration testing with airborne platform - Conduct experiments at Naval test ranges - Assess technical performance and operational utility - Submit to undersea dominance operating concept at-sea Fleet experiment - Assess and support INP and other emerging technologies for transition to acquisition through prototyping and experimentation.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
2.2 Advanced Undersea Weapons Advanced Undersea Weapons initiatives provide limited area denial capability to support Fleet operations. This work will explore the warfighting utilization of emerging naval and industry innovations such as the Multi-Compact Very Light Weight Torpedo Launcher, High Speed Electric Propulsion for the Anti-Torpedo Torpedo as well as other projects which, due to their nature, specific applications and detailed plans, are available at a higher classification level. - Provide technical input to workshops and wargames such as the Undersea Innovation Seminar War Game. - Conduct delta-design and delta-demonstration objective reviews. - Sub-system and integration testing into such programs as the ultra-lightweight torpedo. - Conduct experiments at Naval test ranges. - Assess technical performance and operational utility. - Submit experiments to mine warfare at-sea Fleet experiments such as the Undersea Domain Operation Concept at-sea experiment. - Develop objectives for follow-on experiments that include alternative technologies, more robust capabilities, or alternative employment scenarios. - Assess and support INP and other emerging technologies for transition to acquisition through prototyping and experimentation. 3. Surface Dominance Surface Dominance is focused on a fleet initiative to give the operational commander options to employ naval combat power in any anti-access/area-denial (A2/AD) environment. The emergence of sophisticated sea-denial strategies has driven a need to shift to an offensive imperative to control the seas. Increasing surface-force distributed lethality in offensive weapons and associated concept of operations need more strike options for joint-force commanders and add battlespace complexity to an adversary's calculus. The prototypes and associated experiments will explore new concepts in Naval force employment and enforce the core competencies of sea control when applied with bold new offensive methods. Prototypes in this area will explore:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
1. Identification of advanced research in the sensors and weapons that can be used to project power and counter rapidly evolving missile, air, submarine, and surface threats that challenge our ability to establish dominance at the times and places of our choosing. 2. Development and exploration of new sensors and planning tools that will address a more complex targeting problem while creating more favorable conditions to project power where required. 3. Experimentation with technologies and methods to more fully integrate the Navy and Marine Corps combat team to provide persistent presence that can influence and control events at sea and in the littorals. 4. Provide feedback to the planning and production of weapons, sensor, tactical tools and employment methods to address a more broadly deployed lethality. 3.1 Weapon Systems and Integration This project will explore innovative and emerging electronics and control systems, sensors, payloads, and weapons technologies that have the capability of upgrading the offensive capability of surface combatants. Rapidly integrate and demonstrate weapon system prototypes into existing and modular weapon systems to demonstrate increased lethality, range and effectiveness. This work will explore the warfighting utilization of emerging naval and industry innovations, such as advanced gun systems and propelling charge designs, low cost imaging terminal seekers, enhanced lethality warheads, and directed energy technologies. - Assess and support INPs, naval research and development emerging technologies, and industry innovations - Alternative weapon platform/payload concept optimization study - Conduct demonstration objective review - Provide technical inputs to Fleet Battle experiments and wargames - Perform sub-system and tactical decision aid integration testing - Conduct range tests					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Using experimentation, assess technical performance and operational utility. - Experimentation planning for multiple alternative platforms in a maritime relevant environment. 3.2 Persistent Over-the-Horizon Engagement This aspect of the campaign will concentrate on how to use alternative weapon concepts and the integration of innovative payloads. This work will explore the warfighting utilization of emerging naval research and development and industry innovations, such as the various Nemesis modules the nature of which, specific applications and detailed plans are available at a higher classification level. - Conduct requirements and trade space analysis in support of CONOPS refinement. - Complete design and demonstration objective reviews. - Perform sub-system and integration testing. - Conduct experiments in a maritime relevant environment during Trident Warrior and RIMPAC exercises. - Assess technical performance and operational utility. - Develop objectives for follow-on experiments that include alternative technologies, more robust capabilities, or alternative employment scenarios. - Assess INP and other emerging technologies for transition to acquisition through prototyping and experimentation ***FY 2018 Base Plans:*** The rapid prototyping and demonstration process is iterative and responsive to warfighting needs, capability gaps, naval priorities, and technology opportunities. The FY18 execution plan will draw upon the focus areas, projects and plans outlined below and are based on USFF prioritized warfighting needs, assessments of emerging technology, and as informed by recent analysis, wargames and other experimentation results. The project focus areas reflect the Navy's strategic shift in national security to the Asia-Pacific Theater, and also address the requirement to continue to reduce lifecycle costs across all systems. The FY 2018 rapid development cycle execution plan will select promising technologies for rapid prototype and demonstration consistent with the focus areas.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
The FY 2018 execution plan will be finalized in Q4 FY 2017 and will address key focus areas outlined in the FY 2018 plans. It is important to note that prototype initiatives will be continuously assessed to ensure Fleet needs and priorities are addressed. 1. Electromagnetic Maneuver Warfare Electromagnetic Maneuver Warfare (EMW) is the Navy and Marine Corps warfighting approach to gain decisive military advantage in the electromagnetic spectrum, to enable freedom of action across all naval mission areas. Advanced components and prototypes will demonstrate multi-spectral sensors; passive detection, tracking, and targeting systems; real time spectrum awareness; robust, resilient circuits, transceivers, links; electronic protection; emissions management; spread spectrum techniques; deception and decoys; electronic attack (including directed energy); networked sensors and weapon systems; battle management aids; or cyber situational awareness, security, and operations. a. Battlespace Awareness. Emerging technology and engineering innovations from Naval/DoD research and development, industry, and academia will be integrated to demonstrate intelligence, surveillance, reconnaissance (ISR), and targeting support. Advanced sensing capabilities (ship-, airborne-, and ground-based; multi-, hyper-spectral, and other) capable of long-range sensing and discrimination are required to understand electromagnetic emissions and ultimately produce fire control quality data. This work will explore the warfighting utilization of emerging naval innovations such as Tactical Nighttime Wide-Area Surveillance, Ultra Wide Field Of View (FOV) Area Surveillance, and others. - Survey naval research and development, industry and academia sources for emerging sensors and processing capabilities. - Conduct trade studies to support CONOPS refinement. - Develop prototypes and perform sub-system and integration testing. - Conduct experiments at naval labs and test ranges. - Assess technical performance and operational utility at focused events such as Rim of the Pacific Exercise (RIMPAC) 2018. - Develop objectives for follow-on Fleet experiments that include alternative technologies, more robust capabilities, or alternative employment scenarios. - Assess and support INP and other emerging technologies for transition to acquisition through prototyping and experimentation. b. Naval Tactical Data Links and Networks. Emerging technology and engineering innovations from Naval/DoD research and development, industry, and academia will be integrated to demonstrate secure, reliable,					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
collection, analysis, and fusion of ISR and targeting data from organic assets and sensors. This work will explore the warfighting utilization of emerging naval and industry innovations, to include INPs, such as multiple, simultaneous, wideband data links, for signal and imagery data transmission between organic assets and Battle Group level processing systems. Technologies with the potential to provide Unit-level access to ISR data will be submitted to the Fleet for experimentation. Projects will integrate mature technologies developed through naval investments in the areas of low probability of intercept and detection techniques, high data rate, long-range, multi-band and wide-band links, networked and software defined modes, and encryption and signal processing technologies. - Conduct requirements analysis in support of CONOPS refinement. - Complete design and demonstration objective reviews. - Perform sub-system and integration testing. - Conduct experiments in a simulated maritime relevant environment. - Assess technical performance and operational utility. - Submit to Fleet experimentation venues such as the Naval Tactical Data Network at-sea experiment. - Assess technical performance and operational utility. - Develop objectives for follow-on experiments that include alternative technologies, more robust capabilities, or alternative employment scenarios. - Assess and support INP and other emerging technologies for transition to acquisition through prototyping and experimentation. c. Counter ISR and Targeting. Emerging technology and engineering innovations from Naval/DoD research and development, industry, and academia will be integrated to demonstrate directed energy and other prototype systems to counter enemy ISR and targeting systems, conduct electronic attack, and deploy jammers and decoys. . This work will explore the warfighting utilization of emerging naval and industry innovations, such as High Power Radio Frequency Counter-UAS, Tactical EO-IR-SIGINT Integrated for Targeting, as well as other prototypes. - Technical assessment of emerging sensors, systems, and processing capabilities. - Participate and provide technical inputs to planned naval tabletop workshops, mission planning events, and wargames such as those planned in support of the Naval Integrated Fires Campaign. - Complete design and demonstration objective reviews. - Perform sub-system and integration testing. - Conduct experiments against threat surrogates in a maritime relevant environment. - Assess technical performance and operational utility.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Develop objectives for follow-on wargames and Trident Warrior/Rim of the Pacific (RIMPAC 2018). - Assess and support INP and other emerging technologies for transition to acquisition through prototyping and experimentation. d. Data Fusion and Tactical Decision Aid. Emerging technology and engineering innovations from Naval/DoD research and development, industry, and academia will be integrated to demonstrate automated data-fusion engines and networked tactical decision aids which leverage networked sensors, radars, combat systems, and weapons to overcome single-platform limitations. This work will explore the warfighting utilization of emerging naval and industry innovations, to include INPs, autonomous data fusion and processing modules, as well as other prototypes. - Conduct requirements analysis in support of CONOPS refinement. - Complete demonstration objective reviews. - Software development and integration testing. - Conduct experiments in a simulated maritime relevant environment. - Assess technical performance and operational utility. - Human System Interface (HSI) assessments. - Develop objectives for follow-on experiments that include alternative technologies, more robust capabilities, or alternative employment scenarios. - Assess and support INP and other emerging technologies for transition to acquisition through prototyping and experimentation. 2. Undersea Dominance. Undersea Dominance is focused on developing advanced components and prototypes to compliment the submarine force with affordable fixed and mobile arrays, distributed netted sensors, autonomous systems, and advanced payloads. Technologies with the potential to close anti-submarine warfare and mine warfare warfighting gaps will be submitted to the undersea dominance operating concept and mine warfare at-sea experiments. a. Advanced Payloads and Sensors. Emerging technology and engineering innovations from Naval/DoD research and development, industry, and academia will be integrated to demonstrate advanced payloads and sensors to support anti-submarine and mine warfare missions. This work will explore the warfighting utilization of emerging naval and industry innovations such as Remote Aerial Sonar and Communications Acoustic Laser System, Acoustic Communications modules that enable collaborative mission execution between distributed					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
systems such as the heavy weight torpedo, Compact Rapid Attack Weapon, and Compact Modular Sensor and processing Suite as well as other projects. - Update requirements and CONOPS based on emerging technology and experimentation results - Conduct delta-design and delta-demonstration objective reviews - Perform acoustic sub-system and integration testing with airborne platform - Conduct experiments at Naval test ranges - Assess technical performance and operational utility - Submit to undersea dominance operating concept at-sea Fleet experiment - Assess and support INP and other emerging technologies for transition to acquisition through prototyping and experimentation. b. Advanced Undersea Weapons. Advanced Undersea Weapons initiatives provide limited area denial capability to support Fleet operations. This work will explore the warfighting utilization of emerging naval and industry innovations such as the Multi-Compact Very Light Weight Torpedo Launcher, High Speed Electric Propulsion for the Anti-Torpedo Torpedo as well as other projects. - Provide technical input to workshops and wargames such as the Undersea Innovation Seminar War Game. - Conduct delta-design and delta-demonstration objective reviews. - Sub-system and integration testing into such programs as the ultra-lightweight torpedo. - Conduct experiments at Naval test ranges. - Assess technical performance and operational utility. - Submit experiments to mine warfare at-sea Fleet experiments such as the Undersea Domain Operation Concept at-sea experiment. - Develop objectives for follow-on experiments that include alternative technologies, more robust capabilities, or alternative employment scenarios. - Assess and support INP and other emerging technologies for transition to acquisition through prototyping and experimentation. 3. Surface Dominance. Surface Dominance is focused on a fleet initiative to give the operational commander options to employ naval combat power in any anti-access/area-denial (A2/AD) environment. The emergence of sophisticated sea-denial strategies has driven a need to shift to an offensive imperative to control the seas. Increasing surface-force distributed lethality in offensive weapons and associated concept of operations need more strike options for joint-force commanders and add battlespace complexity to an adversary's calculus. The					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
prototypes and associated experiments will explore new concepts in Naval force employment and enforce the core competencies of sea control when applied with bold new offensive methods. Prototypes in this area will explore: 1. Identification of advanced research in the sensors and weapons that can be used to project power and counter rapidly evolving missile, air, submarine, and surface threats that challenge our ability to establish dominance at the times and places of our choosing. 2. Development and exploration of new sensors and planning tools that will address a more complex targeting problem while creating more favorable conditions to project power where required. 3. Experimentation with technologies and methods to more fully integrate the Navy and Marine Corps combat team to provide persistent presence that can influence and control events at sea and in the littorals. 4. Provide feedback to the planning and production of weapons, sensor, tactical tools and employment methods to address a more broadly deployed lethality. a. Weapon Systems and Integration. This project will explore innovative and emerging electronics and control systems, sensors, payloads, and weapons technologies that have the capability of upgrading the offensive capability of surface combatants. Rapidly integrate and demonstrate weapon system prototypes into existing and modular weapon systems to demonstrate increased lethality, range and effectiveness. This work will explore the warfighting utilization of emerging naval and industry innovations, such as advanced gun systems and propelling charge designs, low cost imaging terminal seekers, enhanced lethality warheads, and directed energy technologies. - Assess and support INPs, naval research and development emerging technologies, and industry innovations - Alternative weapon platform/payload concept optimization study - Conduct demonstration objective review - Provide technical inputs to Fleet Battle experiments and wargames - Perform sub-system and tactical decision aid integration testing - Conduct range tests - Using experimentation, assess technical performance and operational utility. - Experimentation planning for multiple alternative platforms in a maritime relevant environment. b. Persistent Over-the-Horizon Engagement. This aspect of the campaign will concentrate on how to use alternative weapon concepts and the integration of innovative payloads. This work will explore the warfighting					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
utilization of emerging naval research and development and industry innovations, of which specific applications and detailed plans are available at a higher classification level. - Conduct requirements and trade space analysis in support of CONOPS refinement. - Complete design and demonstration objective reviews. - Perform sub-system and integration testing. - Conduct experiments in a maritime relevant environment during Trident Warrior and RIMPAC exercises. - Assess technical performance and operational utility. - Develop objectives for follow-on experiments that include alternative technologies, more robust capabilities, or alternative employment scenarios. - Assess INP and other emerging technologies for transition to acquisition through prototyping and experimentation ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.000	40.356	25.876	0.000	25.876

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: FY 2018 Navy		Date: May 2017
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prototype Development, Experimentation and Demonstration	PO	NUWC : Various	0.000	0.000		8.679	Jul 2017	0.000		-		0.000	Continuing	Continuing	Continuing
Prototype Development, Experimentation and Demonstration	PO	SPAWAR : Various	0.000	0.000		8.739	Jul 2017	0.000		-		0.000	Continuing	Continuing	Continuing
Prototype Development, Experimentation and Demonstration	MIPR	NRL : Washington, DC	0.000	0.000		4.261	Jul 2017	0.000		-		0.000	0.000	4.261	-
Prototype Development, Experimentation and Demonstration	MIPR	NSWC : Various	0.000	0.000		9.668	Jul 2017	0.000		-		0.000	0.000	9.668	-
Prototype Development, Experimentation and Demonstration	MIPR	NAWC : Various	0.000	0.000		9.009	Jul 2017	0.000		-		0.000	0.000	9.009	-
Prototype Development, Experimentation and Demonstration	Various	TBD : TBD	0.000	0.000		0.000		25.876	Mar 2018	-		25.876	0.000	25.876	-
		Subtotal	0.000	0.000		40.356		25.876		-		25.876	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		40.356		25.876		-		25.876	-	-	-

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: FY 2018 Navy		Date: May 2017
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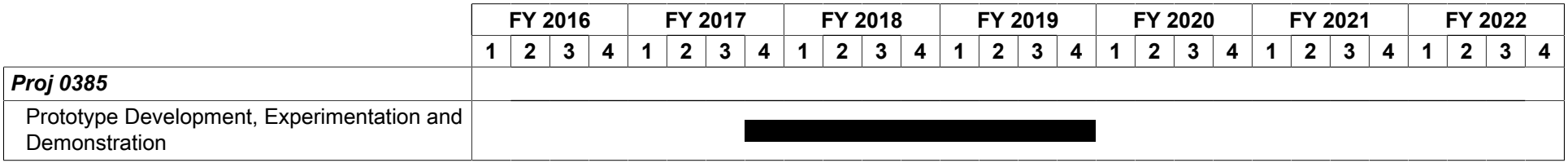

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
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Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 0385				
Prototype Development, Experimentation and Demonstration	4	2017	4	2019

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
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COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0399: *Unmanned Rapid Prototype Development*	0.000	0.000	15.027	15.361	-	15.361	15.347	15.357	15.380	15.691	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

This project was new in FY2017.

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 adversary's growing capabilities. The Unmanned Systems (UxS) Rapid Prototype Development project supports the goals and objectives of the Chief of Naval Operations (CNO) Navigation Plan and Design for Maintaining Maritime Superiority, Commandant of the Marine Corps (CMC) Planning Guidance, and the Cooperative Strategy for 21st Century Seapower, and 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 unmanned prototyping to rapidly field new warfighting capabilities, concepts and technologies, and engineering solutions..

The Unmanned Rapid Prototype Development project funds a strategic focus on prioritization of UxS 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 prototypes to provide advanced warfighting capabilities, new technologies and engineering innovations across all Naval warfighting domains. Prototype development efforts will be used to inform/refine Concepts of Operation (CONOPS) and operational requirements; evaluate the operational utility and technical feasibility of technology/engineering innovations; support limited fielding of prototypes; and mitigate cost, schedule and performance risks associated with follow-on acquisition programs.

In support of the Fleet Forces Command, Naval Warfighting Development Centers, Naval Warfare Development Command, and the Marine Corps Combat Development and Integration Command, this project will leverage the scientific and engineering expertise and technical infrastructure within the NR&DE to produce UxS sensors, weapon systems, and command, control, and communications prototypes to address naval warfighting needs and pursue future naval warfighting concepts. Additionally, new and emerging UxS technologies and engineering innovations that offer the potential to reduce cost, increase readiness, or improve the overall efficiency or effectiveness of naval forces will be explored. A key distinction is that the process and battle rhythm is designed for optimal responsiveness to Fleet needs.

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.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Unmanned Rapid Prototype Development, Experimentation and Demonstration	0.000	15.027	15.361	0.000	15.361
Articles:	-	-	-	-	-

Description: The project implements a pioneering strategic approach to the development and introduction of innovative unmanned system (UxS) technologies to the fleet.

The iterative rapid development cycle consists of:
- the identification and prioritization of warfighting needs for unmanned warfare systems
- the survey of existing the most promising technologies to satisfy the warfighting needs and to close capability gaps
- the rapid prototyping and demonstration of mature technologies to address the highest priority warfighting needs to verify capability and military utility prior to transition to acquisition

Prototyping and demonstration efforts exercise mature UxS technologies in operationally relevant environments to assess their operational utility and their ability to meet warfighter needs. 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. In addition, these efforts will enable the NR&DE to assess technical maturity of Innovative Naval Prototypes (INP) and other emerging technologies for efficient transition to acquisition through prototyping and demonstration. The project technology initiatives will deliver game-changing capability to meet warfighting needs and close capability gaps with unmanned systems on the ground, in the air, on the sea, and under the sea.

FY 2016 Accomplishments:
N/A

FY 2017 Plans:
The Unmanned Systems Rapid Prototype, Development, Experimentation and Demonstration process is iterative,
nimble, and responsive to warfighting needs, capability gaps, naval priorities, and technology opportunities.
The project focus areas are in alignment with DoD and Navy Unmanned System Roadmaps, reflect the Navy's strategic shift in

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603382N / *Advanced Combat Systems Tech*	**Project (Number/Name)** 0399 / *Unmanned Rapid Prototype Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
national security to the Asia-Pacific Theater, and also address the requirement to continue to reduce lifecycle costs across all systems, including unmanned systems. The FY 2017 rapid development cycle execution plan will select promising technologies for rapid prototype and demonstration consistent with the focus areas. 1. Advanced UxS Air, Surface, Undersea, and Ground System Payloads and Platforms This focus is on the development and integration of emerging UxS platforms and/or system payloads from across naval research and development, industry, and academia to inform requirements/trade space analysis, CONOPS development, and to evaluate the warfighting utility and multi-mission employment options of advanced prototypes. UxS prototypes will be evaluated through a series of iterative prototypes and demonstrations. Those UxS prototypes which demonstrate the potential to satisfy warfighting capability needs or gaps or expand UxS employment options will be incorporated into planned UxS rapid prototyping and demonstration events in FY17. Project will integrate mature technologies developed through Naval S&T investments, such as autonomous and supervisory control systems, dynamic contingency re-planning, advanced power/energy systems, artificial intelligence, advanced GPS and radar technology, Fast data fusion algorithms, and modular weapons as developed for the Autonomous Aerial Cargo Utility System (AACUS), the Common UAS Launch and Recovery Project, the Medium Displacement Unmanned Surface Vehicle (MDUSV), Cargo Unmanned Ground Vehicle (UGV), Low-cost UAV swarming Technology (LOCUST), USV swarm prototypes, and other S&T prototypes. More specifically, the emerging technologies that contribute to the following needed Joint Capability Areas (JCAs) will receive priority: a. Battlespace Awareness. UxS payloads and/or platforms in all domains (air, sea, undersea, and ground) that significantly					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
advance the ability to conduct Intelligence, Surveillance, and Reconnaissance (ISR) and environment collection related tasks. b. Force Application. In the air domain, technologies for Unmanned Aircraft Systems (UAS) for air-to-air combat, electronic warfare, and suppression and defeat of enemy air defense. In the maritime domain, both Unmanned Undersea Vehicle (UUV) and Unmanned Surface Vehicle (USV) technologies for mine laying and mine neutralization. c. Protection. Advanced technologies to assist in attack prevention or effects mitigation, including explosive ordnance disposal (EOD). d. Logistics. Cargo payload or platform systems with persistence to provide resupply of sea-based assets in high risk Anti- Access/Area Denial (A2/AD) environments. Specific project efforts in this comprehensive focus area include: - Conduct warfighter requirement, capability gap, and technical solution trade space analysis. - Evaluate technology assessments and review requirements analysis. - Evaluate potential for multi-mission utility and employment options. - Develop initial design, technical performance and demonstration objectives. - Prototype interoperable payload and platform systems and capabilities. - Complete prototype system/sub-system development, integration and testing for demonstration in relevant (to include simulated) maritime environments. - Perform final design, technical performance, and demonstration objective reviews. - Provide technical and demonstration objectives in support of CONOPS/Tactics, Techniques, and Procedures (TTP) development. - Refine and deliver demonstration plans in support of experiment/Fleet exercise events. - Execute demonstration plans and assess technical performance and operational utility. - Develop design change and new objectives for follow-on experiments/Fleet exercises, as required, to address alternative technologies, addition of more robust capabilities, or alternative employment methods to include multiple-UxS scenarios. - Update requirements and CONOPS/TTPs based on experiment/Fleet exercise results.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Provide technical data to inform Fleet models, simulations and wargames. 2. Autonomy and Cognitive Behavior Apply emerging technology and engineering innovations in all domains to provide control of basic vehicle operations and behavior for communications, systems effectiveness, and reduced manpower. Technologies for manpower reduction during mission performance, data collection and analysis, and planning and re-planning are high priorities. Additional emerging technology includes increased system, sensor, and analytical automation to develop, record, playback, project, and parse data and deliver "actionable" intelligence. - Conduct warfighter requirement, capability gap, and technical solution tradespace analysis. - Evaluate technology assessments and review requirements analysis. - Conduct Human-System Interface (HSI) assessment. - Evaluate potential for multi-mission utility and employment. - Develop initial design, technical performance and demonstration objectives. - Complete prototype system/sub-system development, integration and testing for demonstration in relevant (to include simulated) environments. - Perform final design, technical performance, and demonstration objective reviews. - Provide technical and demonstration objectives in support of CONOPS/CONEMP development. - Refine and deliver demonstration plans in support of experiment/Fleet exercise events. - Execute demonstration plans and assess technical performance, operational utility, and extent of manpower interaction with the UxS. - Assess need for design change and new objectives for follow-on experiments/Fleet exercises that may address alternative technologies, additional capabilities, or use methods. - Update CONOPS/CONEMPS based on experiment/Fleet exercise results. - Provide technical data to inform Fleet models, simulations and wargames. 3. Common Command and Control System					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603382N / *Advanced Combat Systems Tech*	**Project (Number/Name)** 0399 / *Unmanned Rapid Prototype Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Leverage emerging technologies and engineering innovations which support the warfighting utility and multi-mission capability of unmanned systems across vehicle classes, variants, and domains for integration in common Naval architecture and frameworks for the common command and control of vehicles. The project integrates mature technologies developed through naval research and development investments to enable UxS long-range and autonomous operation, such as developed for the Large Diameter UUV, Autonomous Aerial Cargo Utility System and Anti-Submarine Continuous Trail Unmanned Vessel (ACTUV). Additional technologies and capabilities to be developed include doctrine, systems and procedures to dynamically task and manage remote UxS and associated sensors, and Navy UxS interoperability with United States Air Force (USAF) and DoD/OGA where operationally or fiscally beneficial. Specific project efforts in this comprehensive focus area include: - Conduct warfighter requirement, capability gap, and technical solution tradespace analysis. - Evaluate technology assessments and review requirements analysis. - Evaluate potential for multi-platform, multi-mission utility and employment methods. - Develop initial design, technical performance and demonstration objectives. - Prototype interoperable and common command and control system technologies/capabilities, including mission planning and mission control software. - Complete prototype system/sub-system development, integration and testing for demonstration in relevant (to include simulated) environments. - Perform final design, technical performance, and demonstration objective reviews. - Provide technical and demonstration objectives in support of CONOPS/CONEMP development. - Refine and deliver demonstration plans in support of experiment/Fleet exercise events. - Execute demonstration plans and assess technical performance and operational utility. - Develop design change and new objectives for follow-on experiments/Fleet exercises. - Update requirements and CONOPS/CONEMPS based on experiment/Fleet exercise results. - Provide technical data to inform Fleet models, simulations and wargames.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
4. Common Data Exfiltration and Transport Integrate emerging technologies and engineering innovations for transporting collected data from each UxS into existing C4I networks, including technologies for UxS platforms to adaptively connect to a network; a compatible means to rapidly offload collected sensor data for immediate exploitation and analysis; the tagging and universal discovery of all UxS collected data and information; and the mitigation of potential network vulnerabilities associated with UxS data transport. Specific project efforts in this comprehensive focus area include: - Conduct warfighter requirement, capability gap, and technical solution tradespace analysis. - Evaluate technology assessments and review requirements analysis. - Evaluate potential for multi-platform, multi-mission utility and employment. - Develop initial design, technical performance and demonstration objectives. - Prototype interoperable, common, data exfiltration and transport hardware/software technologies. - Complete prototype system/sub-system development, integration and testing for demonstration in relevant (to include simulated) environments. - Perform final design, technical performance, and demonstration objective reviews. - Provide technical and demonstration objectives in support of CONOPS/TTP development. - Refine and deliver demonstration plans in support of experiment/Fleet exercise events. - Execute demonstration plans and assess technical performance and operational utility. - Develop design change and new objectives for follow-on experiments/Fleet exercises, if required, that may address alternative technologies, addition of more robust capabilities, or alternative employment methods. - Update requirements and CONOPS/TTPs based on experiment/Fleet exercise results. - Provide technical data to inform Fleet models, simulations and wargames.					
5. Communication Systems, Spectrum, and Resilience Development and integration of emerging technologies to increase the availability of UxS communication links, the amount					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
of data the communication links support, certification of the communication spectrum, and the resilience of all radio frequency (RF) subsystems against interference (e.g., electromagnetic). Advanced technologies include multi-focused, super cooled antennas, conformal phased array antennas, cloud-enabled enterprise data centers, advanced error control, network path diversity, optical communications, and commercial gateway points-of-presence with digital inter-facility transport. Specific project efforts in this comprehensive focus area include: - Conduct warfighter requirement, capability gap, and technical solution tradespace analysis. - Evaluate technology assessments and review requirements analysis. - Evaluate potential for multi-platform, multi-mission utility and employment. - Develop initial design, technical performance and demonstration objectives. - Prototype interoperable, certifiable communication systems and resilience technology. - Complete prototype system/sub-system development, integration and testing for demonstration in relevant (to include simulated) environments. - Perform final design, technical performance, and demonstration objective reviews. - Provide technical and demonstration objectives in support of CONOPS/TTP development. - Refine and deliver demonstration plans in support of experiment/Fleet exercise events. - Execute demonstration plans and assess technical performance and operational utility. - Develop design change and new objectives for follow-on experiments/Fleet exercises, if required, that may address alternative technologies, addition of more robust capabilities, or alternative employment methods. - Update requirements and CONOPS/TTPs based on experiment/Fleet exercise results. - Provide technical data to inform Fleet models, simulations and wargames. 6. Interoperability and Modularity Development and integration, in cooperation with joint, interagency, intergovernmental, and multinational (JIIM) partners, of standard information exchange requirements (IERs) that address joint and Service needs, interoperability profiles (IOPs),					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
middleware, and other technologies needed to achieve the necessary level of interoperability across manned and unmanned systems. Emerging capabilities include software reprogrammable interfaces, universal payload adapters, federated mission computing, and multiple input/multiple output systems and subsystems. Specific project efforts in this comprehensive focus area include: - Conduct warfighter requirement, capability gap, and technical solution tradespace analysis. - Evaluate technology assessments and review requirements analysis. - Evaluate potential for multi-platform, multi-mission utility and employment, as well as life-cycle, integration, capability upgrade, maintenance and sustainment cost savings. - Develop initial design, technical performance and demonstration objectives. - Prototype interoperable, modular services and software modules. - Complete prototype system/sub-system development, integration and testing for demonstration in relevant (to include simulated) environments. - Perform final design, technical performance, and demonstration objective reviews. - Provide technical and demonstration objectives in support of CONOPS/CONEMP development. - Refine and deliver demonstration plans in support of experiment/Fleet exercise events. - Execute demonstration plans and assess technical performance and operational utility. - Develop design change and new objectives for follow-on experiments/Fleet exercises, if required, that may address alternative technologies, addition of more robust capabilities, or alternative employment methods. - Update requirements and CONOPS/CONEMPS based on experiment/Fleet exercise results. Provide technical data to inform Fleet models, simulations and wargames. 7. Persistent Resilience Leverage emerging technologies and engineering innovation design schema to provide more effective on-station time for unmanned vehicles in all domains. This includes development and integration of the miniaturization of avionics, power and					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
propulsion technology; reliability, maintainability, and survivability technology improvement; optimized material properties to allow unmanned systems to endure in extreme environments ranging from sandy and hot climates to humid or freezing climates and from high altitudes to fathoms beneath the oceans; and fuel-efficient propulsion and power output technology. Advanced capabilities include reduced size, weight, power, and cooling consumption technologies, low cost/high reliability materials/components, miniaturized warning/self-protection systems, durable materials, and efficient electrical power generation, thermal management propulsion systems. The project integrates mature technologies developed through Naval S&T investments, such as alternative fuels, power and propulsion, and energy systems (including battery, fuel cell, renewable sources) developed for the Large Diameter UUV (LDUUV), Anti-Submarine Continuous Trail Unmanned Vessel (ACTUV), and other power/energy initiatives. Specific project efforts in this comprehensive focus area include: - Conduct warfighter requirement, capability gap, and technical solution tradespace analysis. - Evaluate technology assessments and review requirements analysis. - Evaluate potential for mission endurance and/or multi-platform, multi-mission utility. - Develop initial design, technical performance and demonstration objectives. - Prototype emerging technologies. - Complete prototype system/sub-system development, integration and testing for demonstration in relevant (to include simulated) environments. - Perform final design, technical performance, and demonstration objective reviews. - Provide technical and demonstration objectives in support of CONOPS/CONEMP development. - Refine and deliver demonstration plans in support of experiment/Fleet exercise events. - Execute demonstration plans and assess technical performance and operational utility. - Develop design change and new objectives for follow-on experiments/Fleet exercises, if required, that may address alternative technologies, addition of more robust capabilities, or alternative employment methods.					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Update requirements and CONOPS/CONEMPs based on experiment/Fleet exercise results. - Provide technical data to inform Fleet models, simulations and wargames. 8. Research and Intelligence/Technology Protection (RITP) Development and integration of emerging UxS technologies to prevent unauthorized access/control, unauthorized/ unintentional disclosure of data, and preservation of technological superiority from across naval research and development, industry, and academia. Specific project efforts in this comprehensive focus area include: - Evaluate project technologies in terms of RITP preservation of critical mission advantage over adversaries. - Implement and assess information controls in project development and execution to ensure RITP is maintained. - Incorporate RITP and cyber security protection in project requirements, and investigate additional capabilities and CONOPs/CONEMPS serving to counter or mitigate adversary responses. - Prototype technologies with potential to advance RITP postures. - Execute demonstration plans and assess technical performance and operational utility. - Update project requirements and CONOPS/CONEMPs based on technology developments and experiment/ Fleet exercise results. ***FY 2018 Base Plans:*** The rapid prototyping and demonstration process is iterative and responsive to warfighting needs, capability gaps, naval priorities, and technology opportunities. FY 2017 projects will be continued and completed if not terminated. In addition, the FY18 execution plan will draw upon the focus areas, projects and plans outlined below and are based on USFF prioritized warfighting needs, assessments of emerging technology, and as informed by recent analysis, wargames and other experimentation results. The project focus areas are in alignment with DOD and Navy Unmanned System Roadmaps, reflect the Navy's strategic shift in national security to the Asia-Pacific Theater, and also address the requirement to continue to reduce lifecycle costs across all systems, including unmanned systems. The FY 2018 rapid development cycle execution plan will select promising technologies for rapid prototype and demonstration consistent with the focus areas.					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
1. Advanced UxS Air, Surface, Undersea, and Ground System Payloads and Platforms This focus is on the development and integration of emerging UxS platforms and/or system payloads from across naval research and development, industry, and academia to inform requirements/trade space analysis, CONOPS development, and to evaluate the warfighting utility and multi-mission employment options of advanced prototypes. UxS prototypes will be evaluated through a series of iterative prototypes and demonstrations. Those UxS prototypes which demonstrate the potential to satisfy warfighting capability needs or gaps or expand UxS employment options have been incorporated into planned UxS rapid prototyping and demonstration events in FY18. Where applicable projects will integrate mature technologies developed through Naval S&T investments, such as explosive and non-lethal technologies. More specifically, the emerging technologies that contribute to the following needed Joint Capability Areas (JCAs) will receive priority: a. Battlespace Awareness. UxS payloads and/or platforms in all domains (air, sea, undersea, and ground) that significantly advance the ability to conduct Intelligence, Surveillance, and Reconnaissance (ISR) and environment collection related tasks. b. Force Application. In the air domain, technologies for Unmanned Aircraft Systems (UAS) for air-to-air combat, electronic warfare, and suppression and defeat of enemy air defense. In the maritime domain, both Unmanned Undersea Vehicle (UUV) and Unmanned Surface Vehicle (USV) technologies for mine laying and mine neutralization. c. Protection. Advanced technologies to assist in attack prevention or effects mitigation, including explosive ordnance disposal (EOD). d. Logistics. Cargo payload or platform systems with persistence to provide resupply of sea-based assets in high risk Anti-Access/Area Denial (A2/AD) environments. Specific project efforts in this comprehensive focus area include: - Conduct warfighter requirement, capability gap, and technical solution trade space analysis. - Evaluate technology assessments and review requirements analysis. - Evaluate potential for multi-mission utility and employment options. - Develop initial design, technical performance and demonstration objectives. - Prototype interoperable payload and platform systems and capabilities.					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Complete prototype system/sub-system development, integration and testing for demonstration in relevant (to include simulated) maritime environments. - Perform final design, technical performance, and demonstration objective reviews. - Provide technical and demonstration objectives in support of CONOPS/Tactics, Techniques, and Procedures (TTP) development. - Refine and deliver demonstration plans in support of experiment/fleet exercise events. - Execute demonstration plans and assess technical performance and operational utility. - Develop design change and new objectives for follow-on experiments/fleet exercises, as required, to address alternative technologies, addition of more robust capabilities, or alternative employment methods to include multiple-UxS scenarios. - Update requirements and CONOPS/TTPs based on experiment/fleet exercise results. - Provide technical data to inform fleet models, simulations and wargames. 2. Autonomy and Cognitive Behavior Apply emerging technology and engineering innovations in all domains to provide control of basic vehicle operations and behavior for communications, systems effectiveness, and reduced manpower. Technologies for manpower reduction during mission performance, data collection and analysis, and planning and re-planning are high priorities. Additional emerging technology includes increased system, sensor, and analytical automation to develop, record, playback, project, and parse data and deliver "actionable" intelligence. Specific project efforts in this comprehensive focus area include: - Conduct warfighter requirement, capability gap, and technical solution tradespace analysis. - Evaluate technology assessments and review requirements analysis. - Conduct Human-System Interface (HSI) assessment. - Evaluate potential for multi-mission utility and employment. - Develop initial design, technical performance and demonstration objectives. - Complete prototype system/sub-system development, integration and testing for demonstration in relevant (to include simulated) environments. - Perform final design, technical performance, and demonstration objective reviews. - Provide technical and demonstration objectives in support of CONOPS/CONEMP development. - Refine and deliver demonstration plans in support of experiment/fleet exercise events.					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Execute demonstration plans and assess technical performance, operational utility, and extent of manpower interaction with the UxS. - Assess need for design change and new objectives for follow-on experiments/fleet exercises that may address alternative technologies, additional capabilities, or use methods. - Update CONOPS/CONEMPS based on experiment/fleet exercise results. - Provide technical data to inform fleet models, simulations and wargames. 3. Common Command and Control System Leverage emerging technologies and engineering innovations which support the warfighting utility and multi-mission capability of unmanned systems across vehicle classes, variants, and domains for integration in common Naval architecture and frameworks for the common command and control of vehicles. The project integrates mature technologies developed through naval research and development investments to enable command and control of UxS long-range autonomous operations. Additional technologies and capabilities to be developed include doctrine, systems and procedures to dynamically task and manage remote UxS and associated sensors, and Navy UxS interoperability with United States Air Force (USAF) and DOD/Other Government Agency (OGA) where operationally or fiscally beneficial. Specific project efforts in this comprehensive focus area include: - Conduct warfighter requirement, capability gap, and technical solution tradespace analysis. - Evaluate technology assessments and review requirements analysis. - Evaluate potential for multi-platform, multi-mission utility and employment methods. - Develop initial design, technical performance and demonstration objectives. - Prototype interoperable and common command and control system technologies/capabilities, including mission planning and mission control software. - Complete prototype system/sub-system development, integration and testing for demonstration in relevant (to include simulated) environments. - Perform final design, technical performance, and demonstration objective reviews. - Provide technical and demonstration objectives in support of CONOPS/CONEMP development. - Refine and deliver demonstration plans in support of experiment/fleet exercise events. - Execute demonstration plans and assess technical performance and operational utility. - Develop design change and new objectives for follow-on experiments/fleet exercises. - Update requirements and CONOPS/CONEMP based on experiment/fleet exercise results. - Provide technical data to inform fleet models, simulations and wargames.					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
4. Common Data Exfiltration and Transport Integrate emerging technologies and engineering innovations for transporting collected data from each UxS into existing C4I networks, including technologies for UxS platforms to adaptively connect to a network; a compatible means to rapidly offload collected sensor data for immediate exploitation and analysis; the tagging and universal discovery of all UxS collected data and information; and the mitigation of potential network vulnerabilities associated with UxS data transport. Specific project efforts in this comprehensive focus area include: - Conduct warfighter requirement, capability gap, and technical solution tradespace analysis. - Evaluate technology assessments and review requirements analysis. - Evaluate potential for multi-platform, multi-mission utility and employment. - Develop initial design, technical performance and demonstration objectives. - Prototype interoperable, common, data exfiltration and transport hardware/software technologies. - Complete prototype system/sub-system development, integration and testing for demonstration in relevant (to include simulated) environments. - Perform final design, technical performance, and demonstration objective reviews. - Provide technical and demonstration objectives in support of CONOPS/TTP development. - Refine and deliver demonstration plans in support of experiment/fleet exercise events. - Execute demonstration plans and assess technical performance and operational utility. - Develop design change and new objectives for follow-on experiments/fleet exercises, if required, that may address alternative technologies, addition of more robust capabilities, or alternative employment methods. - Update requirements and CONOPS/TTPs based on experiment/fleet exercise results. - Provide technical data to inform fleet models, simulations and wargames. 5. Communication Systems, Spectrum, and Resilience Development and integration of emerging technologies to increase the availability of UxS communication links, the amount of data the communication links support, certification of the communication spectrum, and the resilience of all radio frequency (RF) subsystems against interference (e.g., electromagnetic). Advanced technologies include multi-focused, super cooled antennas, conformal phased array antennas, cloud-enabled enterprise data centers, advanced error control, network path diversity, optical communications, and commercial					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
gateway points-of-presence with digital inter-facility transport. Specific project efforts in this comprehensive focus area include: - Conduct warfighter requirement, capability gap, and technical solution tradespace analysis. - Evaluate technology assessments and review requirements analysis. - Evaluate potential for multi-platform, multi-mission utility and employment. - Develop initial design, technical performance and demonstration objectives. - Prototype interoperable, certifiable communication systems and resilience technology. - Complete prototype system/sub-system development, integration and testing for demonstration in relevant (to include simulated) environments. - Perform final design, technical performance, and demonstration objective reviews. - Provide technical and demonstration objectives in support of CONOPS/TTP development. - Refine and deliver demonstration plans in support of experiment/fleet exercise events. - Execute demonstration plans and assess technical performance and operational utility. - Develop design change and new objectives for follow-on experiments/fleet exercises, if required, that may address alternative technologies, addition of more robust capabilities, or alternative employment methods. - Update requirements and CONOPS/TTPs based on experiment/fleet exercise results. - Provide technical data to inform fleet models, simulations and wargames. 6. Interoperability and Modularity Development and integration, in cooperation with joint, interagency, intergovernmental, and multinational (JIIM) partners, of standard information exchange requirements (IERs) that address joint and Service needs, interoperability profiles (IOPs), middleware, and other technologies needed to achieve the necessary level of interoperability across manned and unmanned systems. Emerging capabilities include software reprogrammable interfaces, universal payload adapters, federated mission computing, and multiple input/multiple output systems and subsystems. Specific project efforts in this comprehensive focus area include: - Conduct warfighter requirement, capability gap, and technical solution tradespace analysis. - Evaluate potential for multi-platform, multi-mission utility and employment, as well as life-cycle, integration, capability upgrade, maintenance and sustainment cost savings. - Develop initial design, technical performance and demonstration objectives. - Prototype interoperable, modular services and software modules.					

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Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603382N / *Advanced Combat Systems Tech*	**Project (Number/Name)** 0399 / *Unmanned Rapid Prototype Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Complete prototype system/sub-system development, integration and testing for demonstration in relevant (to include simulated) environments. - Perform final design, technical performance, and demonstration objective reviews. - Provide technical and demonstration objectives in support of CONOPS/CONEMP development. - Refine and deliver demonstration plans in support of experiment/fleet exercise events. - Execute demonstration plans and assess technical performance and operational utility. - Develop design change and new objectives for follow-on experiments/fleet exercises, if required, that may address alternative technologies, addition of more robust capabilities, or alternative employment methods. - Update requirements and CONOPS/CONEMPS based on experiment/fleet exercise results. - Provide technical data to inform fleet models, simulations and wargames. 7. Persistent Resilience Leverage emerging technologies and engineering innovation design schema to provide more effective on-station time for unmanned vehicles in all domains. This includes development and integration of the miniaturization of avionics, power and propulsion technology; reliability, maintainability, and survivability technology improvement; optimized material properties to allow unmanned systems to endure in extreme environments ranging from sandy and hot climates to humid or freezing climates and from high altitudes to fathoms beneath the oceans; and fuel-efficient propulsion and power output technology. Advanced capabilities include reduced size, weight, power, and cooling consumption technologies, low cost/high reliability materials/ components, miniaturized warning/self-protection systems, durable materials, and efficient electrical power generation, thermal management propulsion systems. Specific project efforts in this comprehensive focus area include: - Conduct warfighter requirement, capability gap, and technical solution tradespace analysis. - Evaluate technology assessments and review requirements analysis. - Evaluate potential for mission endurance and/or multi-platform, multi-mission utility. - Develop initial design, technical performance and demonstration objectives. - Prototype emerging technologies. - Complete prototype system/sub-system development, integration and testing for demonstration in relevant (to include simulated) environments. - Perform final design, technical performance, and demonstration objective reviews. - Provide technical and demonstration objectives in support of CONOPS/CONEMP development. - Refine and deliver demonstration plans in support of experiment/fleet exercise events.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603382N / *Advanced Combat Systems Tech*	**Project (Number/Name)** 0399 / *Unmanned Rapid Prototype Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Execute demonstration plans and assess technical performance and operational utility. - Develop design change and new objectives for follow-on experiments/fleet exercises, if required, that may address alternative technologies, addition of more robust capabilities, or alternative employment methods. - Update requirements and CONOPS/CONEMPs based on experiment/fleet exercise results. - Provide technical data to inform fleet models, simulations and wargames. 8. Research and Intelligence/Technology Protection (RITP) Development and integration of emerging UxS technologies to prevent unauthorized access/control, unauthorized/unintentional disclosure of data, and preservation of technological superiority from across naval research and development, industry, and academia. Specific project efforts in this comprehensive focus area include: - Evaluate project technologies in terms of RITP preservation of critical mission advantage over adversaries. - Implement and assess information controls in project development and execution to ensure RITP is maintained. - Incorporate RITP and cyber security protection in project requirements, and investigate additional capabilities and CONOPs/CONEMPS serving to counter or mitigate adversary responses. - Prototype technologies with potential to advance RITP postures. - Execute demonstration plans and assess technical performance and operational utility. - Update project requirements and CONOPS/CONEMPs based on technology developments and experiment/ fleet exercise results. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.000	15.027	15.361	0.000	15.361

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

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603382N / *Advanced Combat Systems Tech*	**Project (Number/Name)** 0399 / *Unmanned Rapid Prototype Development*

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: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603382N / *Advanced Combat Systems Tech*	Project (Number/Name) 0399 / *Unmanned Rapid Prototype Development*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prototype Development, Experimentation and Demonstration	MIPR	NRL : Washington, DC	0.000	0.000		2.103	Jul 2017	0.000		-		0.000	Continuing	Continuing	Continuing
Prototype Development, Experimentation and Demonstration	MIPR	NSWC : Various	0.000	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Prototype Development, Experimentation and Demonstration	MIPR	NUWC : Various	0.000	0.000		11.320	Jul 2017	0.000		-		0.000	Continuing	Continuing	Continuing
Prototype Development, Experimentation and Demonstration	MIPR	SPAWAR : Various	0.000	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Prototype Development, Experimentation and Demonstration	MIPR	NAWC : Various	0.000	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Prototype Development, Experimentation and Demonstration	MIPR	NSWC : Dahlgren, VA	0.000	0.000		1.604	Jul 2017	0.000		-		0.000	Continuing	Continuing	Continuing
Prototype Development, Experimentation and Demonstration	Various	TBD : TBD	0.000	0.000		0.000		15.361	Jan 2018	-		15.361	0.000	15.361	-
		Subtotal	0.000	0.000		15.027		15.361		-		15.361	-	-	-

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 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		15.027		15.361		-		15.361	-	-	-

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: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603382N / *Advanced Combat Systems Tech*	**Project (Number/Name)** 0399 / *Unmanned Rapid Prototype Development*

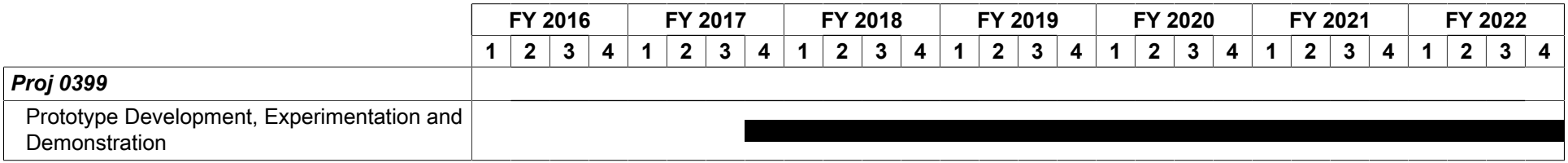

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603382N / *Advanced Combat Systems Tech*	**Project (Number/Name)** 0399 / *Unmanned Rapid Prototype Development*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 0399				
Prototype Development, Experimentation and Demonstration	4	2017	4	2022

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603382N / *Advanced Combat Systems Tech*	Project (Number/Name) 3422 / *SHARC Surface Platform*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3422: *SHARC Surface Platform*	0.000	0.000	0.000	6.775	-	6.775	7.025	0.500	0.000	0.000	0.000	14.300
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Project 3422 - Sensor Hosting Autonomous Remote Craft (SHARC)

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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Sensor Hosting Autonomous Remote Craft (SHARC)	0.000	0.000	6.775	0.000	6.775
Articles:	-	-	-	-	-

Description: This is a new project beginning in FY 2018 - 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 2016 Accomplishments:

N/A

FY 2017 Plans:

N/A

FY 2018 Base Plans:

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

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603382N / *Advanced Combat Systems Tech*	**Project (Number/Name)** 3422 / *SHARC Surface Platform*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
links, networked nodes and software-defined modes, encryption, and signal processing modules. Additional details are available at higher classification levels. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.000	0.000	6.775	0.000	6.775

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

This is a non-acquisition program. Maritime Surveillance Systems (MSS) Program Office (PEO SUB PMS 485) will procure commercial wave gliders from Boeing Liquid Robotics Division for SHARCS (FFP Contract) and TBD Contractors for sensor systems X,Y,Z (CPFF). SPAWAR SSC Pacific will refurbish two type V sensor systems 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-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603382N / *Advanced Combat Systems Tech*	Project (Number/Name) 3423 / *LOCUST*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3423: *LOCUST*	0.000	0.000	0.000	3.500	-	3.500	3.500	3.000	6.000	8.000	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 S&T Budget Activity (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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: LOCUST	0.000	0.000	3.500	0.000	3.500
Articles:	-	-	-	-	-
Description: This is a new project in FY 2018 - 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 2016 Accomplishments: N/A					
FY 2017 Plans: N/A					
FY 2018 Base Plans: 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					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603382N / *Advanced Combat Systems Tech*	**Project (Number/Name)** 3423 / *LOCUST*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
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 capability to degrade threat IADS in support of follow-on manned system operations. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.000	0.000	3.500	0.000	3.500

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

There are two phases for this non-acquisition program.

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.

Phase II - ONR will lead a Counter Integrated Air Defense System (IADS) in FY20-22 to demonstrate the advantages of small swarming UAVs against IADS defenses. ONR 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-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603382N / *Advanced Combat Systems Tech*	Project (Number/Name) 3424 / *Heterogeneous Collaborative Unmanned Systems (HCUS)*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3424: *Heterogeneous Collaborative Unmanned Systems (HCUS)*	0.000	0.000	0.000	8.000	-	8.000	8.000	4.000	0.000	0.000	0.000	20.000
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Project 3424 - Heterogeneous Collaborative Unmanned Systems (HCUS)

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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Heterogeneous Collaborative Unmanned Systems (HCUS)	0.000	0.000	8.000	0.000	8.000
Articles:	-	-	-	-	-
Description: This is a new project in FY 2018 - Develop integrated, adaptable systems of low cost, heterogeneous unmanned platforms capable of autonomous, collaborative behaviors to execute an operational naval mission.					
FY 2016 Accomplishments: N/A					
FY 2017 Plans: N/A					
FY 2018 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603382N / *Advanced Combat Systems Tech*	**Project (Number/Name)** 3424 / *Heterogeneous Collaborative Unmanned Systems (HCUS)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
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. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.000	0.000	8.000	0.000	8.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

This is a non-acquisition program. 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-2, RDT&E Budget Item Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603502N *I Surface & Shallow Water MCM*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	1,212.939	88.092	165.775	154.117	-	154.117	233.873	249.795	257.289	274.909	Continuing	Continuing
0530: *Mine Hunt Systems*	270.881	9.558	9.851	9.761	-	9.761	8.896	8.279	6.869	4.529	Continuing	Continuing
1233: *Surface MCM Mid-life Upgrade*	150.090	6.136	4.237	0.000	-	0.000	0.000	1.021	1.042	1.065	Continuing	Continuing
1234: *Unmanned Surface Vehicle (USV)*	23.259	22.962	43.412	23.594	-	23.594	22.106	16.238	20.052	19.860	Continuing	Continuing
1235: *Mine Warfare Planning and Analysis*	0.000	7.520	8.910	3.139	-	3.139	9.359	8.635	7.043	7.184	Continuing	Continuing
2094.: *Unmanned Underwater Vehicle*	52.964	11.896	67.607	60.187	-	60.187	122.167	139.433	149.242	162.623	Continuing	Continuing
2131: *Assault Breaching System*	595.138	15.097	20.201	11.623	-	11.623	20.950	20.673	17.319	17.666	Continuing	Continuing
2989: *Barracuda*	0.000	0.000	0.000	20.761	-	20.761	33.678	34.769	34.124	39.951	Continuing	Continuing
3123: *SMCM UUV*	120.607	14.923	11.557	25.052	-	25.052	16.717	20.747	21.598	22.031	Continuing	Continuing

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 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.

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 and (6) integrate hardware for experimental testing related to surface ship, aircraft, and other cross platform applications.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	90.472	165.775	157.821	-	157.821
Current President's Budget	88.092	165.775	154.117	-	154.117
Total Adjustments	-2.380	0.000	-3.704	-	-3.704
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.199	0.000			
• SBIR/STTR Transfer	-2.579	0.000			
• Program Adjustments	0.000	0.000	4.984	-	4.984
• Rate/Misc Adjustments	0.000	0.000	-8.688	-	-8.688

Change Summary Explanation

Program Adjustments:

FY16 -$2,380K Total adjustments; SBIR -$2,579K, +$199K BTR.

FY17 No Change

FY18 -$3,704K Total adjustments: +$4,300K Mines Encapsulated Effector; +$20,400K PE realignment from 0604373N for Barracuda Mine Neutralizer; +$4,300K AQS-20 Fiber 2; +$3,108K AN/AQS-20A integration; -$19,106K LDUUV Restructure; -$8,018K Miscellaneous Realignments; -$8,688K Miscellaneous Reductions

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603502N / *Surface & Shallow Water MCM*	Project (Number/Name) 0530 / *Mine Hunt Systems*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0530: *Mine Hunt Systems*	270.881	9.558	9.851	9.761	-	9.761	8.896	8.279	6.869	4.529	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project contains resources for systems, subsystems, and sensors integrated for use with either the Remote Minehunting System (RMS) Remote Multi-Mission Vehicle (RMMV) or the MCM Unmanned Surface Vehicle (MCM USV) for mine detection, classification, localization, identification, 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, identification, and neutralization.

The AN/AQS-20 is a mine hunting and identification system with acoustic and optic sensors housed in an underwater towed body. The acoustic sensors are designated for the detection, classification and localization of bottom, close-tethered, and volume targets. The Volume Search Sonar (VSS) on the AQS-20A sonar is removed from the body and replaced with an Electro-Optic ID (EOID) module to conduct identification sorties. The system will be deployed from the Littoral Combat Ship (LCS) as part of the MCM Mission Package. The RMMV or the MCM USV tows 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 performance. The Forward Looking Sonar will be replaced with a new High Frequency Wideband design (WBFLS). The SLS will be replaced with a new Multi-function 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 will complete 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 FY 2021.

In FY 2017, the AN/AQS-20 Block 2 P3I program will initiate Development Testing (DT) and initiate Synthetic Aperture Sonar (SAS) Acoustic Recognition development and test. The AN/AQS-20 program will also complete the initial build of algorithms and software components to be used for 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 FY21. Development of Depot Maintenance Overhaul and Technical Insertion plans will also occur. Development and Material Reliability, obsolescence, and performance Engineering Change Proposal (ECP) efforts will continue beyond FY20.

In FY 2018, the AN/AQS-20 Block 2 program is scheduled to complete Developmental Testing and initiate the integration of MCM improvements for post mission analysis tools 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-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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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.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: AN/AQS-20 Product Development:	3.522	2.900	3.036	0.000	3.036
Articles:	-	-	-	-	-
FY 2016 Accomplishments: - Complete Software updates for AN/AQS-20 Block 2 EDMs - Initiate Mission Analysis Software tools for AN/AQS-20 Block 2 (AQS-20C variant).					
FY 2017 Plans: - Initiate SAS Acoustic mine recognition development. - Initiate SAS Acoustic mine recognition ECP. - Complete Mission Analysis Software for AN/AQS-20 Block 2. - Correction of deficiencies identified during testing					
FY 2018 Base Plans: - Continue SAS Acoustic mine recognition development. - Continue SAS Acoustic mine recognition ECP. - Initiate algorithm development for AN/AQS-20 Block 2 PMA Improvements. - Initiate development of the Mission Planning Optimizer used to configure the AN/AQS-20 Block 2 sensors. - Update interfaces used to ingest environmental data into the AN/AQS-20 Block 2 PMA tools. - Correction of deficiencies identified during testing.					
FY 2018 OCO Plans: - N/A					
Title: AN/AQS-20 Support:	2.971	2.300	0.900	0.000	0.900
Articles:	-	-	-	-	-
FY 2016 Accomplishments: - Provide ongoing technical engineering support to AN/AQS-20. - Complete updates to logistics products based on the results of LCS MCM MP testing. - Conduct repairs to AN/AQS-20 from LCS MCM MP TECHEVAL. - Conduct test minefield maintenance					
FY 2017 Plans: - Continue to provide ongoing technical engineering support to AN/AQS-20.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Develop Depot Maintenance (Overhaul) Plan. - Continue to conduct test minefield maintenance. - Develop Technical Insertion Plan. ***FY 2018 Base Plans:*** - Provide ongoing technical engineering support to AN/AQS-20. - Continue to conduct test minefield maintenance. - Initiate AN/AQS-20 Block 2 Mission Planning and Post Mission Analysis Concept of Employment development. ***FY 2018 OCO Plans:*** - N/A					
Title: AN/AQS-20 Test and Evaluation	1.765	3.300	5.325	0.000	5.325
Articles:	-	-	-	-	-
FY 2016 Accomplishments: - Conduct AN/AQS-20 Block 2 EDM Testing. - Complete AN/AQS-20 Block 2 EDM initial performance analysis. ***FY 2017 Plans:*** - Initiate AN/AQS-20 Block 2 LRIP Developmental Testing (DT). - Conduct SAS Acoustic recognition Testing. ***FY 2018 Base Plans:*** - Complete AN/AQS-20 Block 2 DT. - Conduct AN/AQS-20 Block 2 PMA Data Collection with test mines under various conditions ***FY 2018 OCO Plans:*** - N/A					
Title: AN/AQS-20 Management Services	1.300	1.351	0.500	0.000	0.500
Articles:	-	-	-	-	-
FY 2016 Accomplishments: - Provide planning and management for the AN/AQS-20 program. - Provide Program Office travel support. ***FY 2017 Plans:***					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Provide planning and management for the AN/AQS-20 program. - Update acquisition documentation in support of Full Rate Production (FRP) Decision Review and Initial Operational Capability (IOC). - Continue to provide Program Office travel support. ***FY 2018 Base Plans:*** - Provide planning and management for the AN/AQS-20 program. - Continue update of acquisition documentation in support of Full Rate Production (FRP) Decision Review. - Continue to provide Program Office travel support. ***FY 2018 OCO Plans:*** - N/A					
Accomplishments/Planned Programs Subtotals	9.558	9.851	9.761	0.000	9.761

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• OPN 1601: *LCS MCM Mission Modules*	67.451	57.146	55.870	-	55.870	73.903	75.373	158.293	188.844	1,406.438	2,165.302

Remarks

Funding displayed on BLI 1601 OPN in total, does not reflect AQS-20 OPN dollars.

D. Acquisition Strategy

AN/AQS-20 LRIP procurement continues 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-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603502N / *Surface & Shallow Water MCM*	Project (Number/Name) 1233 / *Surface MCM Mid-life Upgrade*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
1233: *Surface MCM Mid-life Upgrade*	150.090	6.136	4.237	0.000	-	0.000	0.000	1.021	1.042	1.065	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

UISS and Multi-Function USV funding moved to PE 0603502N Proj:1234 Unmanned Surface Vehicle (USV)
Mine Warfare and Environmental Decision Aids Library (MEDAL) funding moved to Project Unit 1235

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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: HFWB/PRODUCT DEVELOPMENT:	0.677	0.312	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Continued systems engineering, requirements analysis, design and development for AN/SQQ-32(V)4 HFWB P3I Through The Sensor (TTS) effort.					
FY 2017 Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Continue systems engineering, requirements analysis, design and development for AN/SQQ-32(V)4 HFWB P3I TTS effort. ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A					
Title: HFWB/SUPPORT: ***Articles:*** ***FY 2016 Accomplishments:*** Completed software requirements, configuration, and software integration for AN/SQQ-32(V)4 HFWB P3I TTS; Towed Body Performance Monitoring and Fault Location (PMFL) and Towed Body Positioning Solution efforts. ***FY 2017 Plans:*** Continue software requirements, configuration, and software integration for AN/SQQ-32(V)4 HFWB P3I TTS. ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A	0.155 -	0.150 -	0.000 -	0.000 -	0.000 -
Title: HFWB/TEST AND EVALUATION: ***Articles:*** ***FY 2016 Accomplishments:*** Continued to perform lab and at sea testing for AN/SQQ-32(V)4 HFWB P3I TTS effort. Completed lab and at sea testing for PMFL and Towed Body Positioning Solution. ***FY 2017 Plans:*** Continue to perform lab and at sea testing for AN/SQQ-32(V)4 HFWB P3I effort and TTS. ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:***	0.638 -	0.125 -	0.000 -	0.000 -	0.000 -

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A					
Title: SSQ-94 MCM Trainer Development	4.666	3.650	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2016 Accomplishments: SSQ-94 Mine Warfare Countermeasures Simulator; continued development of hardware and software upgrades to the combat system team/individual training capabilities on the MCM Class Ship					
FY 2017 Plans: SSQ-94 Mine Warfare Countermeasures Simulator; continue development of hardware and software upgrades to the combat system team/individual training capabilities on the MCM Class Ship					
FY 2018 Base Plans: N/A					
FY 2018 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	6.136	4.237	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• OPN/2622: *Minesweeping System Replacement*	21.014	56.675	57.023	-	57.023	42.849	41.464	42.296	42.876	Continuing	Continuing

Remarks

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

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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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.

E. Performance Metrics

UISS - Successfully reached Milestone B in FY14; Awarded EDM contract.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603502N / *Surface & Shallow Water MCM*	Project (Number/Name) 1234 / *Unmanned Surface Vehicle (USV)*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
1234: *Unmanned Surface Vehicle (USV)*	23.259	22.962	43.412	23.594	-	23.594	22.106	16.238	20.052	19.860	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

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 Craft of Opportunity (COOP);

2) Mine Hunting USVs (MHUs) include USVs towing AN/AQS-24 mine hunting sonars and associated support equipment, including a command and control center that can be deployed from shore and craft of opportunity. Current MHUs are in response to an Urgent Operational Need (UON) from Naval Forces Central Command with initial funding from FY 2016 Speed to Fleet (S2F) funding to start design to support fabrication of a replacement MHU vehicle, including new command and control center, and associated in-theater support equipment.

3) Unmanned Surface Vehicle with AN/AQS-20 sonar will integrate the existing AQS-20 mine-hunting sonar with an Unmanned Surface Vehicle (USV). This is referred to as the MCM USV and will leverage an existing USV design to include a modular payload capability.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: UISS Product Development	8.163	2.069	2.006	0.000	2.006
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Continued UISS Engineering Development Model (EDM) development.					
FY 2017 Plans: Continue UISS EDM development. Complete construction of USV craft and Unmanned Surface Sweep Payload and complete component level testing. Complete SW development and conduct regression testing to ensure functionality and identify fixes. Execute system integration and test phase. Conduct UISS EDM contractor					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 1234 / *Unmanned Surface Vehicle (USV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
testing (CT) in preparations for Navy Developmental Testing (DT). During CT, identify any design changes that are needed in support of follow on production efforts. ***FY 2018 Base Plans:*** Support completion of UISS DT and Operational Assessment (OA) in support of Milestone C in 3QFY2018. 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. ***FY 2018 OCO Plans:*** N/A					
Title: UISS Support ***Articles:*** ***FY 2016 Accomplishments:*** Engineering, management, and logistics support for UISS system design, development, production, integration, and testing. ***FY 2017 Plans:*** Engineering, management, and logistics support for UISS system design, development, production, integration, and testing. ***FY 2018 Base Plans:*** 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 Q3, preparations for IOC in FY19, and start of the development of proposal for Full Rate Production (FRP). ***FY 2018 OCO Plans:*** N/A	0.976 -	1.260 -	0.200 -	0.000 -	0.200 -
Title: UISS Test and Evaluation ***Articles:*** ***FY 2016 Accomplishments:*** Commence UISS EDM contractor testing (CT). Testing includes craft, sub-system, and component testing in preparation for full system CT. ***FY 2017 Plans:***	1.889 -	1.937 -	0.000 -	0.000 -	0.000 -

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Continue UISS EDM contractor testing (CT) in preparations for Navy Developmental Testing (DT), and commence Developmental Testing (DT). Testing includes both non-stressed and stressed testing when the payload is deployed and powered. USV and sweep payload functionality and performance as well as communications will be tested and verified. ***FY 2018 Base Plans:*** 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. ***FY 2018 OCO Plans:*** N/A					
Title: UISS Management ***Articles:*** ***FY 2016 Accomplishments:*** Continued UISS EDM contract management. Initiated development of Milestone (MS) C documentation. ***FY 2017 Plans:*** Continue UISS EDM contract management. Continue development of MS C documentation. ***FY 2018 Base Plans:*** Manage efforts to get to Milestone C decision in Q3, start preparations for IOC in FY19, and start of the development of proposal for Full Rate Production (FRP)). Manage award of FY18 Low Rate Initial Production (LRIP) option. ***FY 2018 OCO Plans:*** N/A	1.034 -	0.838 -	0.088 -	0.000 -	0.088 -
Title: MHU Product Development ***Articles:*** ***FY 2016 Accomplishments:*** Continued improvements to the Command and Control (C2) center, MHU electronics and associated equipment. Completed initial integration of AN/AQS-24B sonar with MHU. Conducted initial performance testing of AN/ AQS-24B sonar towed from MHUs. Commenced design of one improved MHU hull, additional C2 center	10.500 -	8.186 -	0.100 -	0.000 -	0.100 -

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 1234 / *Unmanned Surface Vehicle (USV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
equipment, and in-theater support equipment. Awarded Non-Recurring Engineering (NRE) initial design contract to Johns Hopkins University (JHU) for MHU 5 w/ Q24B. Conducted System Requirements Review (SRR). ***FY 2017 Plans:*** Deliver refurbished MHU w/ Q24B capability to fleet. Upgrade deployed MHUs to be Q24B compatible. Continue Non-Recurring Engineering (NRE) and hold Preliminary Design Review (PDR)/Critical Design Review (CDR) for MCM USV w/ Q24B. Investigate industry effort to do MHU 5 w/ Q24B deploy & retrieve (D&R) design and fabrication efforts as option to JHU effort. Make decision on plan for who will do MHU 5 w/ Q24B D&R system as well as start efforts for MHU 5 to be able to support AQS-20C as well. Award MHU 5 craft (same craft as MCM USV), payload (Q24B) D&R system efforts, and integration implementation contracts. Commence additional design and initial fabrication efforts. ***FY 2018 Base Plans:*** Complete design, fabrication, and initial integration of MHU 5 w/ Q24B payload. ***FY 2018 OCO Plans:*** N/A					
Title: MHU Support ***Articles:*** ***FY 2016 Accomplishments:*** Provided engineering and logistic support for product improvements and forward-deployed operations. Implemented multiple reliability improvements. ***FY 2017 Plans:*** Provide program management, engineering and logistics support for product improvements and forward deployed operations. Develop measurement system and improvement plan for system reliability. Perform design work to increase system range. ***FY 2018 Base Plans:*** Provide program management, engineering and logistics support for product improvements, to maintain Cyber security compliance and forward deployed operations. Upgrade system to Windows 10. ***FY 2018 OCO Plans:*** N/A	0.400 -	1.414 -	0.200 -	0.000 -	0.200 -
Title: MCM USV w/AQS-20 Product Development	0.000	23.000	17.100	0.000	17.100

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Articles:	-	-	-	-	-
FY 2016 Accomplishments: N/A ***FY 2017 Plans:*** Begin design and fabrication of one MCM USV EDM craft with a modular payload capability to support AN/AQS-20C and future payloads. Assess and implement Raytheon Independent Research and Development (IRAD) efforts for design of deploy and retrieve (D&R) system. Design and begin fabrication of D&R system to integrate the AN/AQS-20C mine-hunting sonar with the USV. Conduct design reviews. Start design & software development efforts for craft and payload integration, command & control, and operations. ***FY 2018 Base Plans:*** Complete fabrication of MCM USV EDM craft and associated Q-20C D&R system. Begin system level integration of initial MCM USV EDM with AN/AQS-20C minehunting sonar. Complete initial design & software development efforts for craft and payload integration, command & control, and operations. Conduct system level testing. Prepare to conduct Urgent Operational Evaluation System (UOES) Employment. ***FY 2018 OCO Plans:*** N/A					
Title: MCM USV w/ AQS-20 Support	0.000	4.708	3.900	0.000	3.900
Articles:	-	-	-	-	-
FY 2016 Accomplishments: N/A ***FY 2017 Plans:*** Provide program management, engineering and technical support for MCM USV EDM design and initial fabrication, and deploy and retrieve design and initial fabrication. Develop tactics, techniques, and procedures for MCM USV with AN/AQS-20C. ***FY 2018 Base Plans:*** Continue program management, engineering and technical support for efforts. Provide program management, engineering and technical support for system level testing and integration. ***FY 2018 OCO Plans:***					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A					
Accomplishments/Planned Programs Subtotals	22.962	43.412	23.594	0.000	23.594

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 0603596N: *LCS Mission Modules*	16.800	3.300	3.900	-	3.900	5.000	1.800	0.000	0.000	0.000	64.129
• OPN/1601: *LCS MCM Mission Modules*	67.451	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	149.435

Remarks

RDT&E Funding included only reflects funding for UISS development efforts.

D. Acquisition Strategy

UISS - Requirements are documented in the Unmanned Influence Sweep System (UISS) Capability Development Document (CDD) and will be 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 3Q FY 2018

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603502N / *Surface & Shallow Water MCM*	Project (Number/Name) 1234 / *Unmanned Surface Vehicle (USV)*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
UISS: Product Development	C/CPIF	Textron Systems Inc : Hunt Valley, MD	12.375	8.163	Dec 2015	2.069	Dec 2016	2.006	Jan 2018	-		2.006	Continuing	Continuing	Continuing
MHU: Product Development	SS/CPFF	APL JHU : Laurel, MD	2.150	9.865	Mar 2016	0.200	Jun 2017	0.200	Jun 2018	-		0.200	0.000	12.415	-
MHU: Product Development	C/FPIF	Textron Systems Inc : Hunt Valley, MD	0.000	0.000		7.545	Mar 2017	0.000		-		0.000	Continuing	Continuing	Continuing
MHU: Product Development	WR	NSWC PC : Panama City, FL	0.501	0.260	Dec 2015	0.311	Dec 2016	0.000		-		0.000	Continuing	Continuing	Continuing
MHU: Product Development	WR	NUWC N : Newport, RI	0.360	0.130	Dec 2015	0.250	Dec 2016	0.100	Mar 2018	-		0.100	Continuing	Continuing	Continuing
MHU: Product Development	WR	NSWC CD : Bethesda, MD	0.110	0.095	Dec 2015	0.030	Dec 2016	0.000		-		0.000	Continuing	Continuing	Continuing
MHU: Product Development	WR	Various : Various	0.420	0.150	Dec 2015	0.050	Dec 2016	0.000		-		0.000	Continuing	Continuing	Continuing
MCM USV: Product Development	C/FPIF	Textron Systems Inc : Hunt Valley, MD	0.000	0.000		11.540	Jan 2017	4.900	Jan 2018	-		4.900	0.000	16.440	-
MCM USV: Product Development	SS/FPIF	Raytheon : Portsmouth, RI	0.000	0.000		5.785	Jun 2017	0.500	Feb 2018	-		0.500	0.000	6.285	-
MCM USV: Product Development	WR	NSWC PC : Panama City, FL	0.000	0.000		2.225	Jan 2017	4.200	Jan 2018	-		4.200	0.000	6.425	-
MCM USV: Product Development	WR	NUWC N : Newport, RI	0.000	0.000		2.270	Jan 2017	3.800	Jan 2018	-		3.800	0.000	6.070	-
MCM USV: Product Development	WR	NSWC, CD : Bethesda, MD	0.000	0.000		0.980	Jun 2017	3.500	Jan 2018	-		3.500	0.000	4.480	-
		Subtotal	15.916	18.663		33.255		19.206		-		19.206	-	-	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
UISS: Engineering Support	WR	NUWC, N : Newport, RI	0.200	0.150	Dec 2015	0.150	Dec 2016	0.000		-		0.000	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603502N / *Surface & Shallow Water MCM*	Project (Number/Name) 1234 / *Unmanned Surface Vehicle (USV)*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
UISS: Engineering Support	WR	NSWC, PC : Panama City, FL	1.486	0.203	Dec 2015	0.250	Dec 2016	0.000		-		0.000	Continuing	Continuing	Continuing
UISS: Engineering Support	WR	NSWC, CD : Bethesda, MD	1.586	0.125	Dec 2015	0.170	Dec 2016	0.000		-		0.000	Continuing	Continuing	Continuing
UISS: Engineering Support	C/CPFF	Textron Systems Inc : Hunt Valley, MD	0.550	0.120	Dec 2015	0.250	Dec 2016	0.200	Jan 2018	-		0.200	Continuing	Continuing	Continuing
UISS: Integrated Logistics	WR	NSWC, PC : Panama City, FL	0.200	0.090	Dec 2015	0.090	Dec 2016	0.000		-		0.000	Continuing	Continuing	Continuing
UISS: Integrated Logistics	WR	NSWC, CD : Bethesda, MD	0.408	0.203	Dec 2015	0.250	Dec 2016	0.000		-		0.000	Continuing	Continuing	Continuing
UISS: Integrated Logistics	C/CPFF	Textron Systems, Inc : Hunt Valley, MD	0.643	0.085	Dec 2015	0.100	Dec 2016	0.000		-		0.000	Continuing	Continuing	Continuing
MHU: Engineering Support	WR	SSC, PAC : San Diego, CA	0.210	0.050	Dec 2015	0.050	Dec 2016	0.000		-		0.000	Continuing	Continuing	Continuing
MHU: Engineering Support	WR	NSWC, PC : Panama City, FL	0.160	0.200	Dec 2015	0.457	Dec 2016	0.050	Feb 2018	-		0.050	Continuing	Continuing	Continuing
MHU: Engineering Support	WR	NUWC, N : Newport, RI	0.160	0.100	Dec 2015	0.477	Dec 2016	0.150	Mar 2018	-		0.150	Continuing	Continuing	Continuing
MHU: Engineering Support	WR	NSWC, CD : Bethesda, MD	0.110	0.050	Dec 2015	0.090	Dec 2016	0.000		-		0.000	Continuing	Continuing	Continuing
MHU: Engineering Support	WR	Various : Various	0.180	0.000		0.340	Dec 2016	0.000		-		0.000	Continuing	Continuing	Continuing
MCM USV Engineering Support	C/CPFF	Textron Systems : Hunt Valley, MD	0.000	0.000		0.000		0.500	Jan 2018	-		0.500	0.000	0.500	-
MCM USV: Engineering Support	WR	NSWC, PC : Panama City, FL	0.000	0.000		2.458	Jan 2017	1.600	Jan 2018	-		1.600	0.000	4.058	-
MCM USV: Engineering Support	WR	NUWC, N : Newport, RI	0.000	0.000		2.250	Jan 2017	1.300	Jan 2018	-		1.300	0.000	3.550	-
MCM USV: Integrated Logistics	C/CPFF	Textron Systems : Hunt Valley, MD	0.000	0.000		0.000		0.500	Jan 2018	-		0.500	0.000	0.500	-
		Subtotal	5.893	1.376		7.382		4.300		-		4.300	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 1234 / *Unmanned Surface Vehicle (USV)*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
UISS: Test and Evaluation	WR	NSWC, PC : Panama City, FL	0.100	0.330	Mar 2016	0.771	Dec 2016	0.000		-		0.000	Continuing	Continuing	Continuing
UISS: Test and Evaluation	WR	NSWC, CD : Bethesda, MD	0.250	0.400	Mar 2016	0.723	Dec 2016	0.000		-		0.000	Continuing	Continuing	Continuing
UISS: Test and Evaluation	C/CPIF	Textron Systems Inc : Hunt Valley, MD	0.050	1.159	Mar 2016	0.443	Dec 2016	0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	0.400	1.889		1.937		0.000		-		0.000	-	-	-

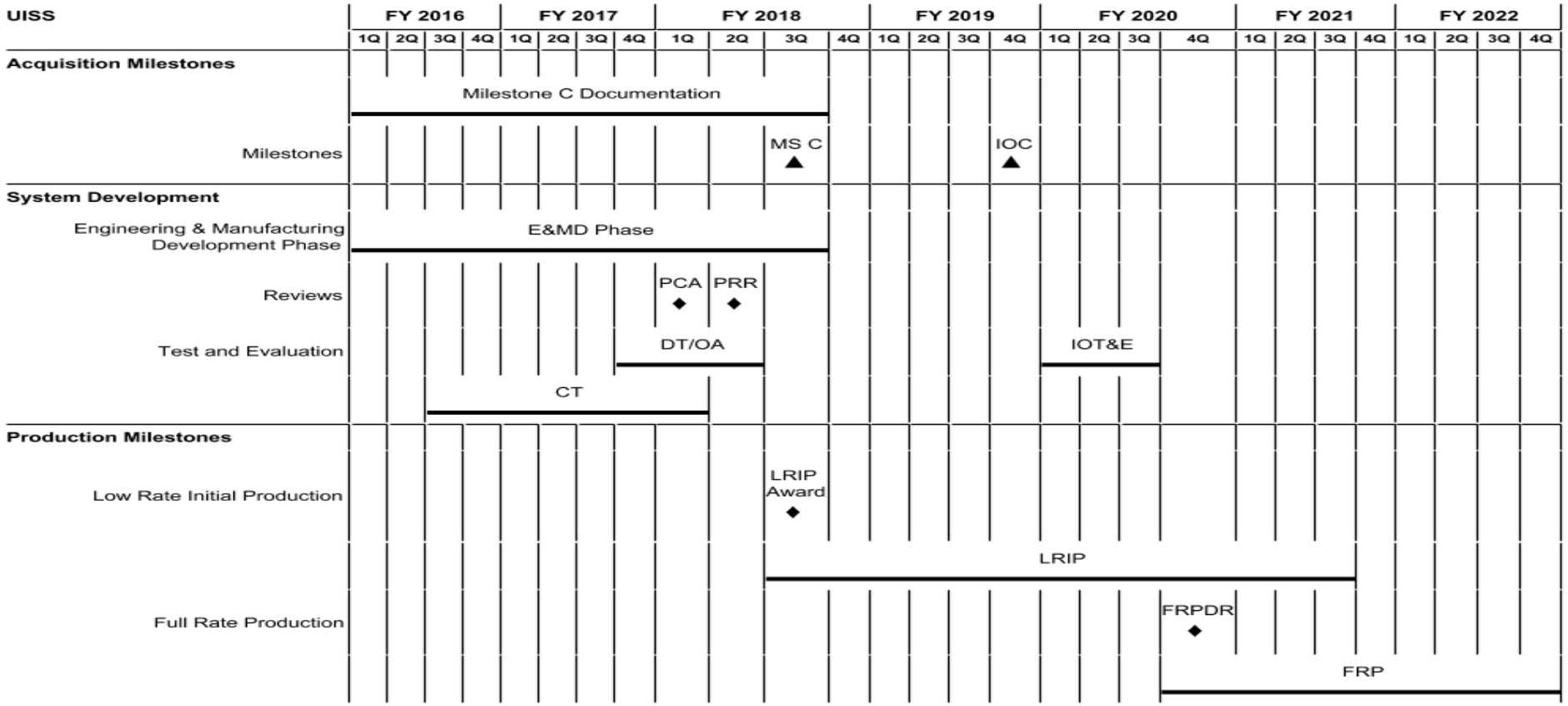
Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
UISS: Travel	WR	NAVSEA : Washington, DC	0.100	0.100	Jun 2016	0.095	Jun 2017	0.020	Jan 2018	-		0.020	0.000	0.315	-
UISS: Management	C/CPAF	TBD : TBD	0.950	0.934	Dec 2015	0.743	Dec 2016	0.068	Nov 2017	-		0.068	Continuing	Continuing	Continuing
		Subtotal	1.050	1.034		0.838		0.088		-		0.088	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	23.259	22.962		43.412		23.594		-		23.594	-	-	-

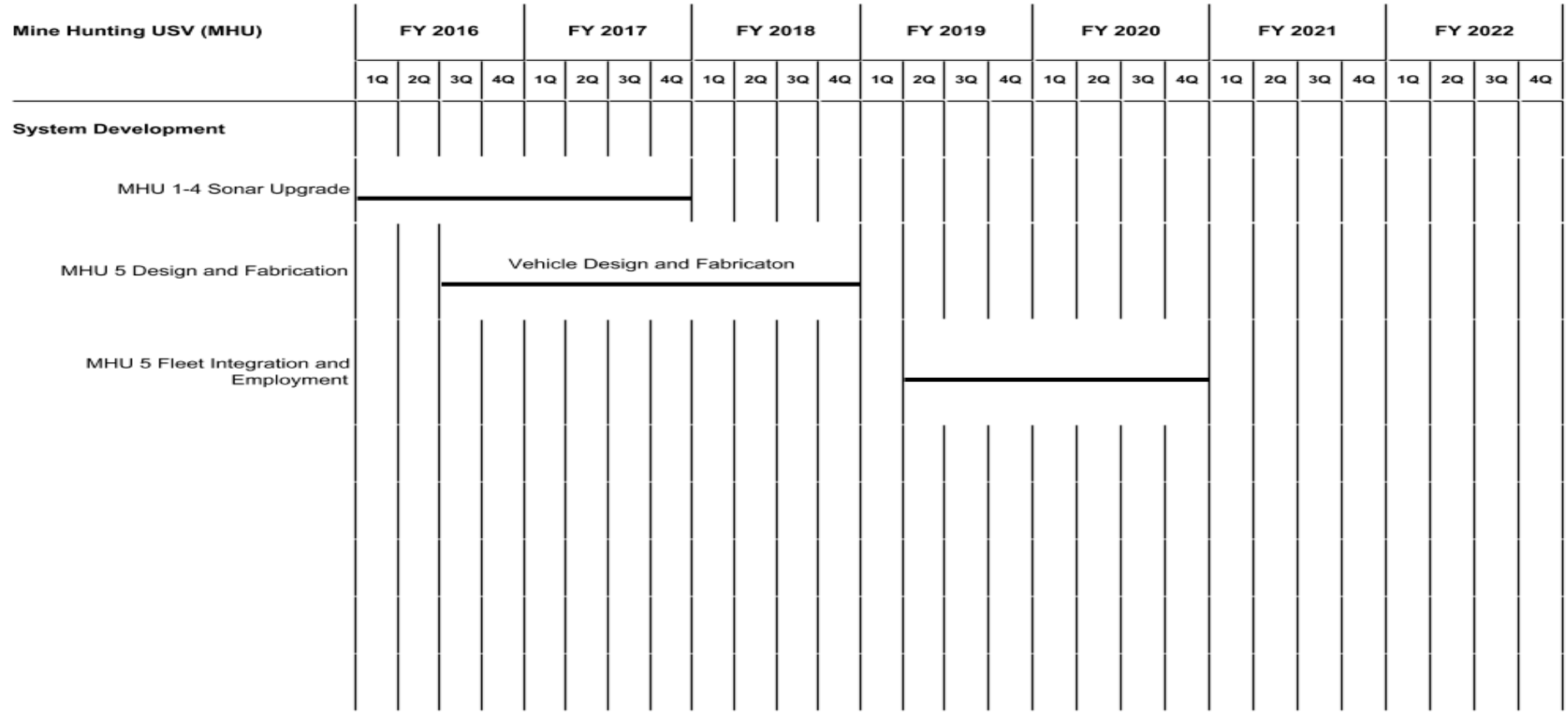
Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 1234 / *Unmanned Surface Vehicle (USV)*



2018PB - 0603502N - 1234

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 1234 / *Unmanned Surface Vehicle (USV)*



2018PB - 0603502N - 1234

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 1234 / *Unmanned Surface Vehicle (USV)*

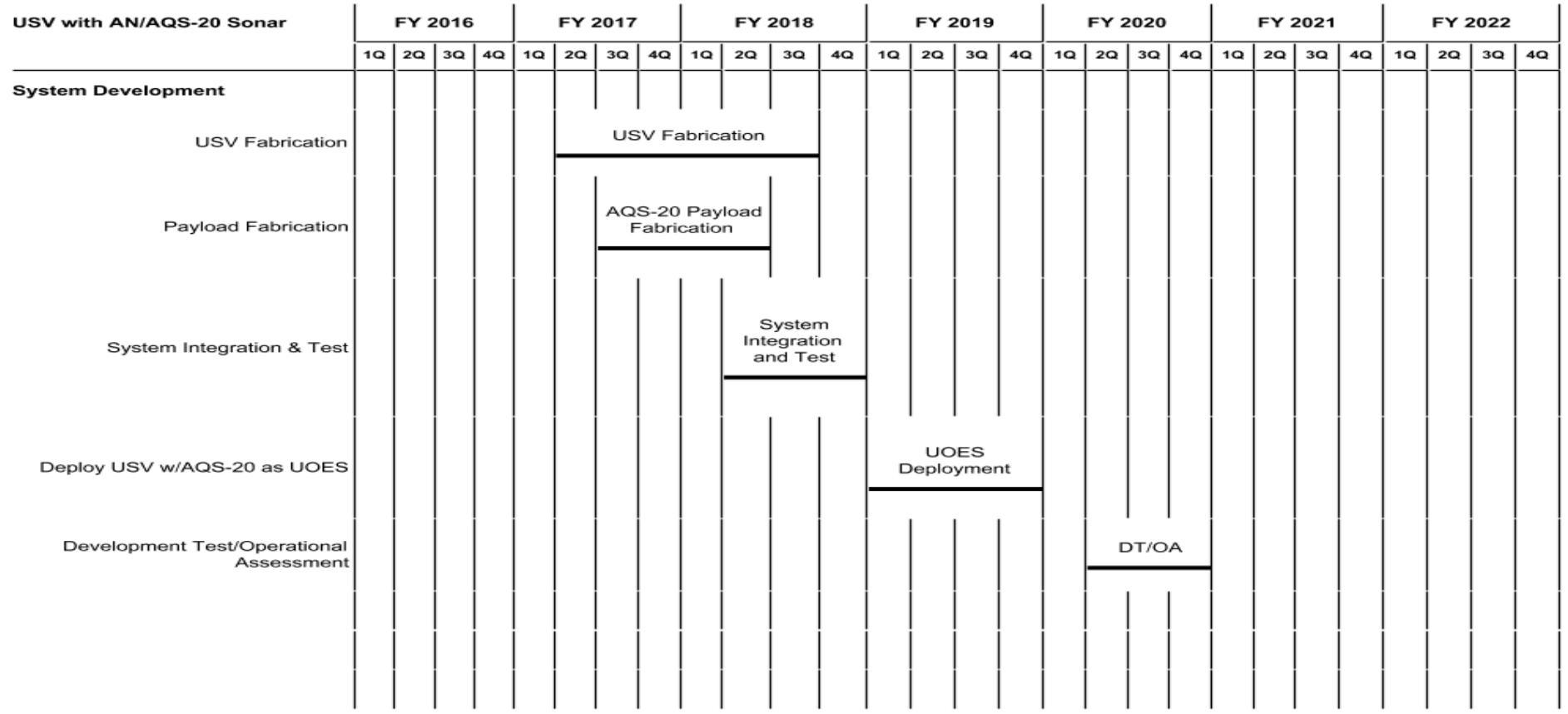


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Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 1234 / *Unmanned Surface Vehicle (USV)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
UISS				
Acquisition Milestones: Milestone C Documentation	1	2016	3	2018
Acquisition Milestones: Milestones: Milestone C	3	2018	3	2018
Acquisition Milestones: Milestones: Initial Operational Capability	4	2019	4	2019
System Development: Engineering & Manufacturing Development Phase: Engineering & Manufacturing Development phase	1	2016	3	2018
System Development: Reviews: Production Readiness Review (PRR)	2	2018	2	2018
System Development: Reviews: Physical Configuration Audit (PCA)	1	2018	1	2018
System Development: Test and Evaluation: DT Testing	4	2017	2	2018
System Development: Test and Evaluation: Initial Operational Test & Evaluation	1	2020	3	2020
System Development: Test and Evaluation: Contractor Testing	3	2016	1	2018
Production Milestones: Low Rate Initial Production: LRIP Contract Award	3	2018	3	2018
Production Milestones: Low Rate Initial Production: LRIP phase	3	2018	3	2021
Production Milestones: Full Rate Production: Full Rate Production Decision Review	4	2020	4	2020
Production Milestones: Full Rate Production: Full	4	2020	4	2022
Mine Hunting USV (MHU)				
System Development: MHU 1-4 Sonar Upgrade: Schedule Detail	1	2016	4	2017
System Development: MHU 5 Design and Fabrication: Schedule Detail	3	2016	4	2018
System Development: MHU 5 Fleet Integration and Employment: Fleet Integration	2	2019	4	2020
USV with AN/AQS-20 Sonar				
System Development: USV Fabrication: Schedule Detail	2	2017	3	2018
System Development: Payload Fabrication: Schedule Detail	3	2017	2	2018

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 1234 / *Unmanned Surface Vehicle (USV)*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
System Development: System Integration & Test: Schedule Detail	2	2018	4	2018
System Development: Deploy USV w/AQS-20 as UOES: Schedule Detail	1	2019	4	2019
System Development: Development Test/Operational Assessment: Schedule Detail	2	2020	4	2020

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603502N / *Surface & Shallow Water MCM*	Project (Number/Name) 1235 / *Mine Warfare Planning and Analysis*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
1235: *Mine Warfare Planning and Analysis*	0.000	7.520	8.910	3.139	-	3.139	9.359	8.635	7.043	7.184	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: MEDAL Product Development	4.464	5.105	1.433	0.000	1.433
Articles:	-	-	-	-	-
FY 2016 Accomplishments: MEDAL EA - Completed MINEnet Tactical integration activities with LCS Mission Package. Completed Information Assurance (IA) accreditation Package and received Authority to Operate MINEnet Tactical v1.x on Navy networks. Completed MINEnet Tactical v1.2 development to include COBRA planning & evaluation capabilities. Develop MEDAL EA v2 supporting documentation development. Delivered MINEnet Tactical course curriculum to Mine Warfare Training Center Point Loma San Diego CA.					
FY 2017 Plans: MEDAL EA - MINEnet Tactical v1.3 development to include Minefield Planning initial capabilities. Continue planning for the development of MEDAL EA v2.0. Update MEDAL EA course curriculum for MINEnet Tactical 1.3.					
FY 2018 Base Plans: MEDAL EA - MINEnet Tactical v1.4 development to include enhanced Minefield Planning capabilities. Continue planning for the development of MEDAL EA v2.0. Update MEDAL EA course curriculum for MINEnet Tactical 1.4.					
FY 2018 OCO Plans: N/A					
Title: MEDAL Support	0.247	0.557	0.423	0.000	0.423
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 1235 / *Mine Warfare Planning and Analysis*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
FY 2016 Accomplishments: Conducted oversight of the technical integration of developed algorithms and models that have demonstrated their effectiveness with respect to their objectives. Supported efforts to 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. Achieve IOC and begin fielding to achieve FOC. Begin the introduction of MEDAL EA MINEnet Tactical v1.1 capability and Planning on Risk (PoR) functionality via a limited fielding to Fleet Users including Mine Countermeasures Squadrons (MCMRONs) and Naval Surface and Mine War-fighting Development Center (SMWDC). ***FY 2017 Plans:*** Continue the development of MEDAL EA MINEnet Tactical v1.3 capability and Planning on Risk (PoR) functionality via a limited fielding to Fleet Users including Mine Countermeasures Squadrons (MCMRONs) and Naval Surface and Mine War-fighting Development Center (SMWDC). 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, government activities, and designated contractors. Assist in providing the speed, agility, adaptability, and flexibility required for modern MCM operations. ***FY 2018 Base Plans:*** Continue the development of MEDAL EA MINEnet Tactical v1.4 capability and Planning on Risk (PoR) functionality via a limited fielding to Fleet Users including Mine Countermeasures Squadrons (MCMRONs) and Naval Surface and Mine War-fighting Development Center (SMWDC). Provide technical integration of developed algorithms and models that have demonstrated their effectiveness with respect to their objectives. Support effort to 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. ***FY 2018 OCO Plans:*** N/A					
Title: MEDAL Test and Evaluation	2.398	2.519	0.675	0.000	0.675
Articles:	-	-	-	-	-
FY 2016 Accomplishments:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 1235 / *Mine Warfare Planning and Analysis*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
MEDAL EA - Conducted series of Devlopment tests (DTs) and a series of regression tests. Continue System Integration testing activities with multiple platforms. Conduct planning for subsequent OA events. Deliver to Fleet in accordance with the MEDAL EA Fielding Plan. ***FY 2017 Plans:*** MEDAL EA v1.3 Conduct series of Development tests (DTs) and a series of regression tests. Continue System Development testing activities with multiple platforms. Deliver to Fleet in accordance with the MEDAL EA Fielding Plan. ***FY 2018 Base Plans:*** MEDAL EA v1.4 Continue to conduct series of Development tests (DTs) and a series of regression tests. Continue System Development testing activities with multiple platforms. Deliver to Fleet in accordance with the MEDAL EA Fielding Plan. ***FY 2018 OCO Plans:*** N/A					
Title: MEDAL Management	0.411	0.729	0.608	0.000	0.608
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Provided program management support and travel for MEDAL program. Program management included 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 2017 Plans:*** 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					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 1235 / *Mine Warfare Planning and Analysis*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
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 2018 Base Plans:*** 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 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	7.520	8.910	3.139	0.000	3.139

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 2622/LV075: *Mine Sweeping Replacement (MEDAL).*	2.973	4.349	3.673	-	3.673	1.135	0.798	0.850	0.000	0.000	16.628

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.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 1235 / *Mine Warfare Planning and Analysis*

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-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603502N / *Surface & Shallow Water MCM*	Project (Number/Name) 2094. / *Unmanned Underwater Vehicle*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2094.: *Unmanned Underwater Vehicle*	52.964	11.896	67.607	60.187	-	60.187	122.167	139.433	149.242	162.623	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: LDUUV Product Development	7.843	61.114	51.838	0.000	51.838
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Completed Test and Evaluation Master Plan (TEMP). Conducted Gate 4 review. Initiated development of government conceptual design for LDUUV prototype. Continued risk reduction experimentation and prototyping efforts to prove LDUUV can meet targets for extended unmanned operation, and submarine and ship integration efforts enabling LDUUV launch and recover from surface ships.					
FY 2017 Plans: Develop government preliminary design for LDUUV risk-reduction prototypes (hydrodynamics, propulsion, payload, and command and control). Conduct Preliminary Design Review (PDR) and start detailed design efforts.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 2094. / *Unmanned Underwater Vehicle*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Conduct risk reduction engineering with battery certification, and initial autonomy efforts to prove LDUUV can meet targets for extended unmanned operation and integration efforts enabling LDUUV launch and recovery from submarines and ships. ***FY 2018 Base Plans:*** Conduct detailed design for two Phase I LDUUV prototypes, and prepare for Critical Design Review (CDR). Continue Industry supported experimentation with autonomy sense and avoidance, Intelligence Preparation of Operational Environment (IPOE) demonstrations, and propulsion, navigation, communications, launch and recovery experimentation to reduce risk with submarine and surface ship integration. ***FY 2018 OCO Plans:*** N/A					
Title: LDUUV Support ***Articles:*** ***FY 2016 Accomplishments:*** Developed and updated program documentation Gate 4 review and preliminary design. ***FY 2017 Plans:*** For government-led effort, initiate program documentation updates (system/subsystem specification and interface control documents) based on prototype preliminary design. ***FY 2018 Base Plans:*** 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. ***FY 2018 OCO Plans:*** N/A	2.694 -	4.839 -	6.662 -	0.000 -	6.662 -
Title: LDUUV Management ***Articles:*** ***FY 2016 Accomplishments:*** Provided program management (PM) support and travel for the LDUUV program. Program management included overall technical guidance and leadership for the program. Oversight of financial and logistics efforts	1.359 -	1.654 -	1.687 -	0.000 -	1.687 -

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 2094. / *Unmanned Underwater Vehicle*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
and coordination with Navy and other DoD organizations and contractors performed to ensure successful execution of the program. Travel and other PM tasking conducted to include briefings, demonstrations, and project planning as required ***FY 2017 Plans:*** Provide program management support and travel for the LDUUV 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. ***FY 2018 Base Plans:*** 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 coordination with Navy and other DoD organizations and contractors as required to ensure successful execution of the program. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	11.896	67.607	60.187	0.000	60.187

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Utilizing Navy requirements to insert incremental capability, the LDUUV program will design, build, and test risk-reducing prototype UUVs in two phases followed by competitive award of a production contract.

E. Performance Metrics

LDUUV - Complete Preliminary Design Review (PDR) 4Q FY17
LDUUV - Complete Critical Design Review (CDR) 3Q FY19

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 2094. / *Unmanned Underwater Vehicle*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
LDUUV Experimentation and Prototype Design	WR	NUWC Newport : Newport, RI	4.444	2.160	Dec 2016	17.430	Dec 2016	9.127	Dec 2017	-		9.127	0.000	33.161	-
LDUUV Experimentation and Prototype Design & Hardware	C/CPFF	Various : Various	13.299	0.000		16.285	Feb 2017	27.871	Feb 2018	-		27.871	0.000	57.455	-
LDUUV Experimentation and Prototype Design	WR	NSWC Carderock : Carderock, MD	0.000	1.705	Dec 2016	5.888	Dec 2016	2.920	Dec 2017	-		2.920	0.000	10.513	-
LDUUV Experimentation and Prototype Design	WR	NSWC PCD : Panama City, FL	0.000	0.400	Dec 2016	0.286	Dec 2016	0.166	Dec 2017	-		0.166	0.000	0.852	-
LDUUV Experimentation and Prototype Design	SS/CPFF	ARL PSU : State College, PA	0.000	0.907	Jan 2017	13.902	Jan 2017	6.176	Jan 2018	-		6.176	0.000	20.985	-
LDUUV Experimentation and Prototype Design	SS/CPFF	APL/JHU : Laurel, MD	0.000	0.988	Jan 2017	0.000		0.000		-		0.000	0.000	0.988	-
LDUUV Experimentation and Prototype Design	WR	SSC Pacific : San Diego, CA	0.000	0.455	Jan 2017	0.659	Jan 2017	0.423	Feb 2018	-		0.423	0.000	1.537	-
LDUUV Experimentation and Prototype Design	WR	NUWC KPT : Keyport, WA	0.000	0.075	Jan 2017	4.826	Jan 2017	4.391	Feb 2018	-		4.391	0.000	9.292	-
LDUUV Experimentation and Risk Reduction Sonar	C/CPFF	ARL UT : Austin, TX	0.000	0.228	Jan 2017	1.198	Jan 2017	0.551	Feb 2018	-		0.551	0.000	1.977	-
LDUUV Experimentation and Risk Reduction - Battery Certification	WR	NSWC Crane : Crane IN	0.000	0.925	Dec 2016	0.640	Dec 2016	0.213	Dec 2017	-		0.213	0.000	1.778	-
		Subtotal	17.743	7.843		61.114		51.838		-		51.838	0.000	138.538	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
LDUUV ILS & Engineering Support	Various	VAR : VAR	17.768	0.000		0.000		0.000		-		0.000	0.000	17.768	-
PLUS ILS & Engineering Support	Various	VAR : VAR	8.321	0.000		0.000		0.000		-		0.000	0.000	8.321	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603502N / *Surface & Shallow Water MCM*	Project (Number/Name) 2094. / *Unmanned Underwater Vehicle*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
LDUUV Engineering Support	WR	NUWC Newport : Newport, RI	0.000	1.079	Dec 2016	2.201	Dec 2016	4.452	Dec 2017	-		4.452	0.000	7.732	-
LDUUV Launch and Recovery Engineering Support	WR	NSWC PCD : Panama City, FL	0.000	0.000		0.300	Dec 2016	0.306	Dec 2017	-		0.306	0.000	0.606	-
LDUUV Hydrodynamics and Propulsion Engineering Support	C/CPFF	VAR : VAR	0.000	0.295	Feb 2017	0.549	Feb 2017	0.450	Feb 2018	-		0.450	0.000	1.294	-
LDUUV Hull and Propulsion Engineering Support	WR	NSWC Carderock : Carderock, MD	0.000	0.288	Dec 2016	0.280	Dec 2016	0.286	Dec 2017	-		0.286	0.000	0.854	-
LDUUV Command and Control Engineering Support	WR	SSC Pacific : San Diego, CA	0.000	0.122	Jan 2017	0.000		0.000		-		0.000	0.000	0.122	-
LDUUV Acoustic Engineering Support	SS/CPFF	ARL UW : Seattle, WA	0.000	0.200	Jan 2017	0.204	Jan 2017	0.208	Jan 2018	-		0.208	0.000	0.612	-
LDUUV Engineering Support	SS/CPFF	APL/JHU : Laurel, MD	0.000	0.275	Jan 2017	0.330	Jan 2017	0.335	Jan 2018	-		0.335	0.000	0.940	-
LDUUV ILS & Engineering Support	WR	NUWC Keyport : Keyport, WA	0.000	0.325	Dec 2016	0.125	Dec 2016	0.125	Dec 2017	-		0.125	0.000	0.575	-
LDUUV ILS & Engineering Support2	SS/CPFF	VAR : VAR	0.000	0.110	Feb 2017	0.850	Feb 2017	0.500	Feb 2018	-		0.500	0.000	1.460	-
		Subtotal	26.089	2.694		4.839		6.662		-		6.662	0.000	40.284	-

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 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	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 2094. / *Unmanned Underwater Vehicle*

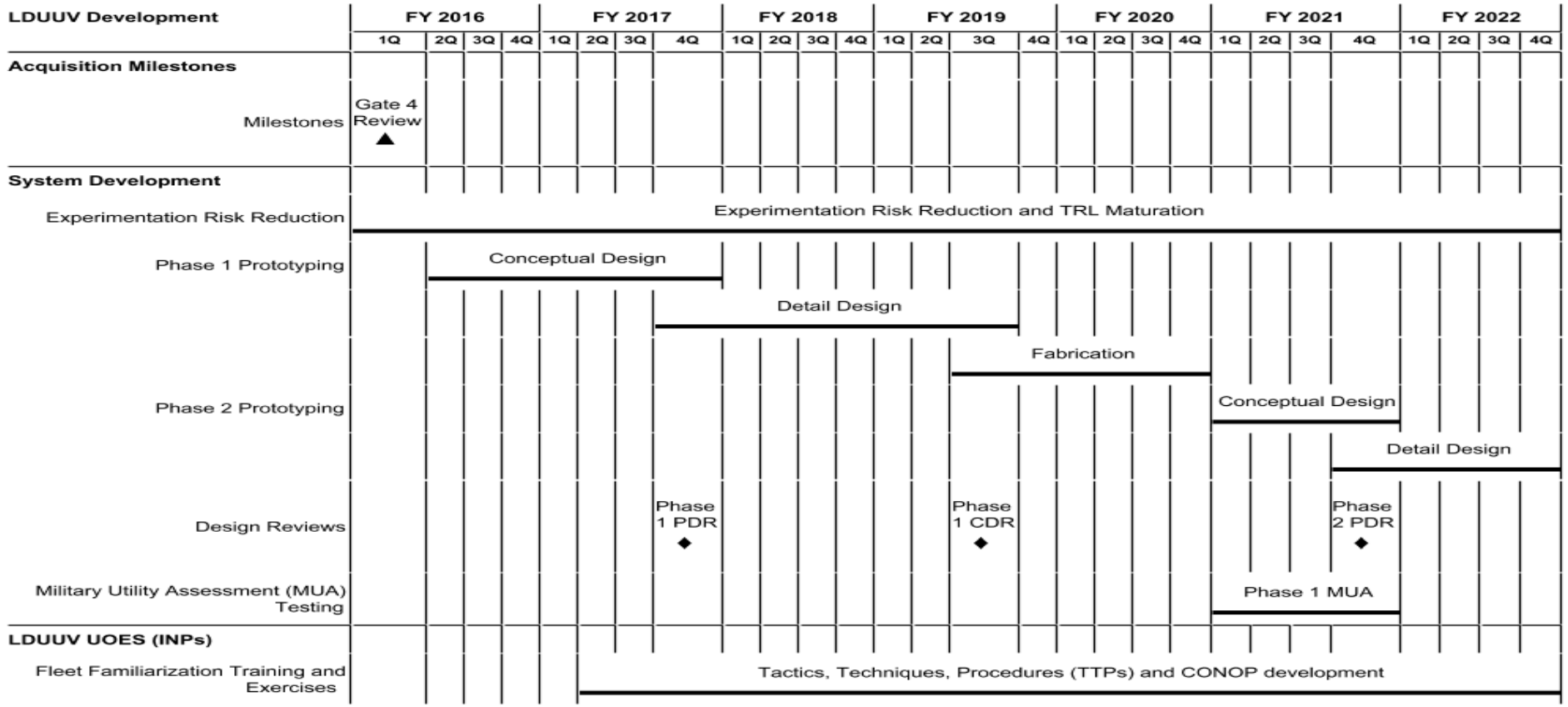
Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
LDUUV Program Management	WR	NUWC Newport : Newport, RI	1.365	0.350	Dec 2016	0.525	Dec 2016	0.536	Dec 2017	-		0.536	Continuing	Continuing	Continuing
LDUUV Program Management	TBD	TBD : TBD	1.075	0.824	Dec 2016	0.970	Dec 2016	0.989	Dec 2017	-		0.989	0.000	3.858	-
LDUUV Travel	Various	NAVSEA : Washington, DC	0.215	0.185	Dec 2016	0.159	Dec 2016	0.162	Dec 2017	-		0.162	0.000	0.721	-
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	4.055	1.359		1.654		1.687		-		1.687	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	52.964	11.896		67.607		60.187		-		60.187	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 2094. / *Unmanned Underwater Vehicle*



2018PB - 0603502N - 2094.L24

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 2094. / *Unmanned Underwater Vehicle*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
LDUUV Development				
Acquisition Milestones: Milestones: Gate 4 Review	1	2016	1	2016
System Development: Experimentation Risk Reduction: Technology Risk Reduction	1	2016	4	2022
System Development: Phase 1 Prototyping: Prototype Conceptual Design	2	2016	4	2017
System Development: Phase 1 Prototyping: Protoype Detail Design	4	2017	3	2019
System Development: Phase 1 Prototyping: Prototype Fabrication	3	2019	4	2020
System Development: Phase 2 Prototyping: Prototype Conceptual Design	1	2021	4	2021
System Development: Phase 2 Prototyping: Prototype Detail Design	4	2021	4	2022
System Development: Design Reviews: Phase 1 PDR	4	2017	4	2017
System Development: Design Reviews: Phase 1 CDR	3	2019	3	2019
System Development: Design Reviews: Phase 2 PDR	4	2021	4	2021
System Development: Military Utility Assessment (MUA) Testing: Phase 1 MUA	1	2021	4	2021
LDUUV UOES (INPs): Fleet Familiarization Training and Exercises: Schedule Detail	2	2017	4	2022

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy										Date: May 2017		
Appropriation/Budget Activity 1319 / 4					R-1 Program Element (Number/Name) PE 0603502N / *Surface & Shallow Water MCM*				Project (Number/Name) 2131 / *Assault Breaching System*			
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
2131: *Assault Breaching System*	595.138	15.097	20.201	11.623	-	11.623	20.950	20.673	17.319	17.666	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. Under the umbrella of evolutionary acquisition, three increments of development are planned. Block I is a multispectral sensor capable of daytime detection of surface-laid minefields and obstacles in the Beach Zone. Block II 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 near real-time processing of multispectral imagery data. Block III adds an interferometric sensor that is capable of detecting buried mines. Blocks II and III will incorporate technology being developed by 6.3 S&T. 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: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Product Development:	8.650	11.836	7.668	0.000	7.668
Articles:	-	-	-	-	-
FY 2016 Accomplishments: COBRA - Continued Block 1 integration Flight Tests with MQ-8B FIRESCOUT. Continued design and development of COBRA Block II capability. JABS - Designed and engineered weapon effectivness for beach zones and surf zones. Precision Navigation/Marking (PN/M) - Continued evaluation/assessment of EDMs supporting PN/M efforts.					
FY 2017 Plans: COBRA - Complete Block 1 integration Flight Tests with MQ-8B FIRESCOUT. Continue design and development of COBRA Block II capability. JABS - Design and engineering of weapon effectivness for beach zones and surf zones. Precision Navigation/Marking (PN/M) - continue evaluation/assessment of EDMs supporting PN/M efforts.					
FY 2018 Base Plans: COBRA - Increase design and development of COBRA Block II hardware and begin initial test planning of Block II capabilities. JABS - Continue design and engineering of weapon effectiveness for beach and surf zones. Precision Navigation/Marking - Continue evaluation/assessment of EDMs supporting PN/M efforts.					
FY 2018 OCO Plans: N/A					
Title: Technical Support:	0.805	1.507	0.942	0.000	0.942
Articles:	-	-	-	-	-
FY 2016 Accomplishments:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
COBRA - Provided mine magazine inventory management and shipping, contract and test/studies, C4I Data Fusion. Provided technical /acquisition support and documentation (ILS, training, data, drawings). ***FY 2017 Plans:*** COBRA - Provide mine magazine inventory management and shipping, contract and test/studies, C4I Data Fusion. Provide technical /acquisition support and documenttation (ILS, training, data, drawings). ***FY 2018 Base Plans:*** COBRA - Continue to provide mine magazine inventory management and shipping, contract and test/studies, C4I Data Fusion. Provide technical /acquisition support and documenttation (ILS, training, data, drawings). ***FY 2018 OCO Plans:*** N/A					
Title: Test and Evaluation:	4.523	5.723	2.209	0.000	2.209
Articles:	-	-	-	-	-
FY 2016 Accomplishments: COBRA - Conducted Block I Development Testing (DT) Phase I. Conducted advanced component Block II Development Testing. Development Testing (DT). JABS - Continued Surf Zone (SZ) and Beach Zone (BZ) characterization testing. PN/M - Continued to test the Precision Navigation and Marking design capability ***FY 2017 Plans:*** COBRA - Continue advanced Block II component Development Testing. JABS - Surf Zone (SZ) and Beach Zone (BZ) characterization testing. PN/M - Continue to test the Precision Navigation and Marking design capability. ***FY 2018 Base Plans:*** COBRA - Conduct surf zone prototype flight testing.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 2131 / *Assault Breaching System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
JABS - Surf Zone (SZ) and Beach Zone (BZ) characterization testing. ***FY 2018 OCO Plans:*** N/A					
Title: Management: ***Articles:***	1.119 -	1.135 -	0.804 -	0.000 -	0.804 -
FY 2016 Accomplishments: Managed Mine magazine inventory management and shipping, contract management and tests/studies, C4I/ Data fusion. ***FY 2017 Plans:*** Manage Mine magazine inventory management and shipping, contract management and tests/studies, C4I/Data fusion. ***FY 2018 Base Plans:*** Continue to manage Mine magazine inventory management and shipping, contract management and tests/ studies, C4I/Data fusion. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	15.097	20.201	11.623	0.000	11.623

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• OPN/2624: *SHALLOW WATER Mine CM SHIP*	0.000	8.875	8.796	-	8.796	8.782	8.901	5.741	5.855	0.000	95.423

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. COBRA Block II technology transferred from ONR and will achieve MS B in 3nd QTR FY17. COBRA Block III technology will transition in FY19.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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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 will achieve IOC in FY 2017.

The above systems continue to meet or exceed their Key Performance Parameters.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Dev, COBRA	C/CPAF	Arete : Tucson, AZ	166.916	5.642	Apr 2016	9.054	Jan 2017	5.347	Dec 2017	-		5.347	0.000	186.959	-
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		0.000		0.781	Oct 2017	-		0.781	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	Continuing	Continuing	Continuing
JABS	WR	NSWC PC : NSWC IH	6.662	1.801	Dec 2015	1.656	May 2017	0.799	Nov 2017	-		0.799	0.000	10.918	-
Training Dev, COBRA	WR	NSWC, PC : PANAMA CITY, FL	10.111	0.475	Nov 2015	0.775	Oct 2016	0.559	Nov 2017	-		0.559	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	8.814	0.251	Oct 2015	0.351	May 2017	0.182	Nov 2017	-		0.182	0.000	9.598	-
Precision Navigation & Marking	WR	NSWC, PC : PANAMA CITY, FL	16.045	0.481	Nov 2015	0.000		0.000		-		0.000	0.000	16.526	-
		Subtotal	396.783	8.650		11.836		7.668		-		7.668	-	-	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Support Equipment	WR	NSWC, PC : PANAMA CITY, FL	20.082	0.649	Oct 2015	0.849	Oct 2016	0.613	Nov 2017	-		0.613	0.000	22.193	-
Software Development	WR	NSWC, PC : PANAMA CITY, FL	8.037	0.000		0.202	Nov 2016	0.000		-		0.000	0.000	8.239	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603502N / *Surface & Shallow Water MCM*	Project (Number/Name) 2131 / *Assault Breaching System*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Integrated Logistics Support	WR	NSWC, IH : INDIAN HEAD, MD	2.712	0.000		0.100	Oct 2016	0.072	Nov 2017	-		0.072	0.000	2.884	-
Configuration Management	WR	NSWC, PC : PANAMA CITY, FL	3.744	0.000		0.100	Nov 2016	0.072	Oct 2017	-		0.072	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, PC : PANAMA CITY, FL	6.120	0.156	Nov 2015	0.256	Nov 2016	0.185	Oct 2017	-		0.185	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	43.683	0.805		1.507		0.942		-		0.942	0.000	46.937	-

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Test & Evaluation	WR	NSWC, IH : INDIAN HEAD, MD	58.424	2.474	Nov 2015	2.525	May 2017	1.126	Oct 2017	-		1.126	0.000	64.549	-
Operational Test & Evaluation	WR	NSWC/ IH, PC : INDIAN HEAD, PANAMA CITY	8.655	0.000		1.175	Nov 2016	0.361	Nov 2017	-		0.361	0.000	10.191	-
Tooling	WR	NSWC/ IH, PC : INDIAN HEAD, PANAMA CITY	0.700	0.000		0.000		0.000		-		0.000	0.000	0.700	-
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	11.585	2.049	Nov 2015	2.023	May 2017	0.722	Nov 2017	-		0.722	0.000	16.379	-
		Subtotal	79.764	4.523		5.723		2.209		-		2.209	0.000	92.219	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 2131 / *Assault Breaching System*

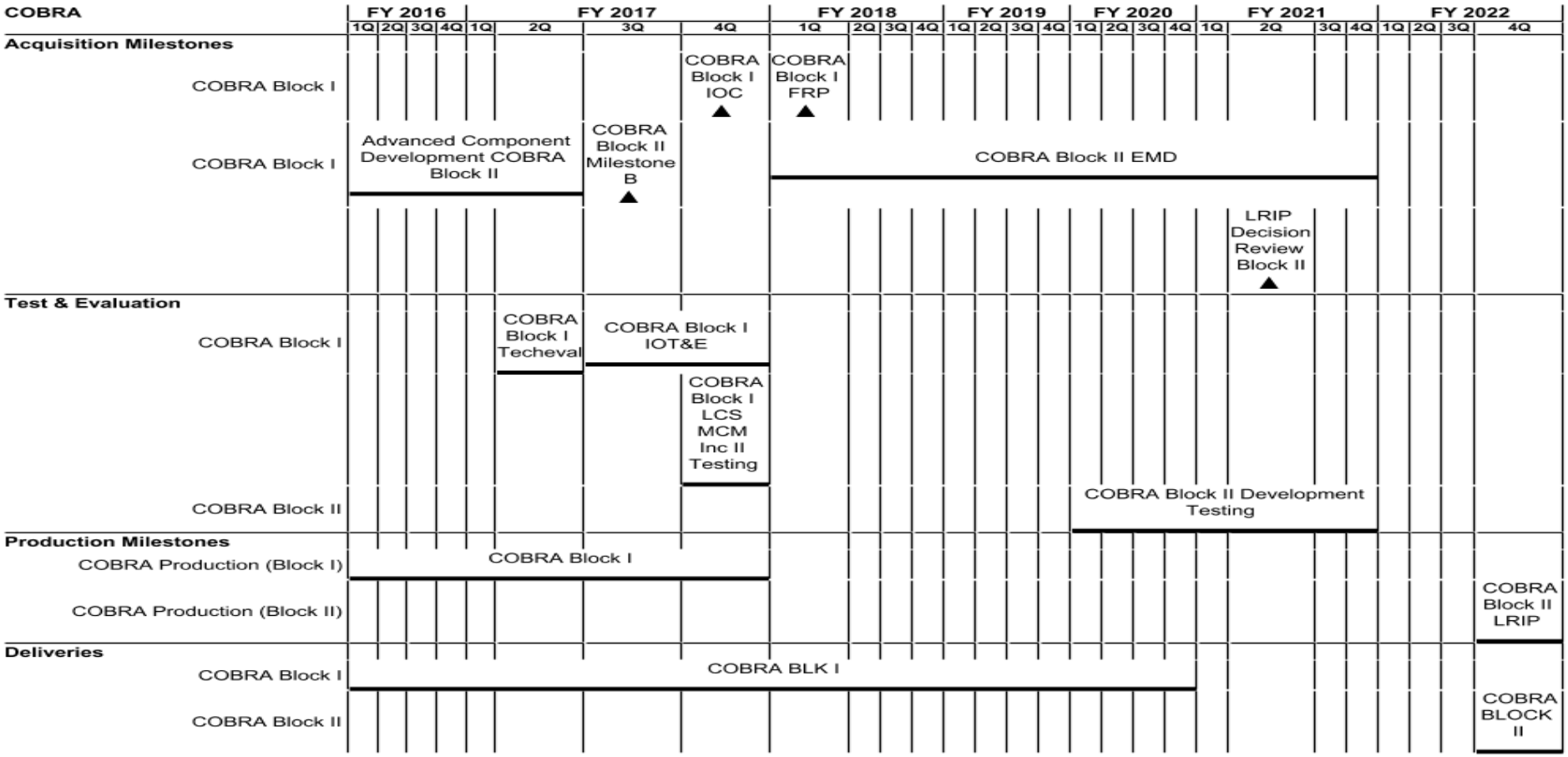
Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Engineering Support	C/CPFF	BAH, NOrthrop Grumman : DC, FL	10.815	0.120	Feb 2016	0.125	Dec 2016	0.090	Dec 2017	-		0.090	0.000	11.150	-
Government Engineering Support	WR	NSWC, IH : INDIAN HEAD, MD	35.579	0.498	Nov 2015	0.509	May 2017	0.359	Nov 2017	-		0.359	0.000	36.945	-
Program Management Support	WR	NSWC/ IH, PC : INDIAN HEAD, PANAMA CITY	25.216	0.441	Nov 2015	0.451	Apr 2017	0.318	Nov 2017	-		0.318	0.000	26.426	-
Travel	WR	NAVSEA : WNY, DC	1.653	0.060	Nov 2015	0.050	Oct 2016	0.037	Oct 2017	-		0.037	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	74.908	1.119		1.135		0.804		-		0.804	0.000	77.966	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	595.138	15.097		20.201		11.623		-		11.623	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 2131 / *Assault Breaching System*



2018PB - 0603502N - 2131

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 2131 / *Assault Breaching System*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
COBRA				
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 I: Advanced Component Development Block II	1	2016	2	2017
Acquisition Milestones: COBRA Block I: COBRA Block II EMD	1	2018	4	2021
Acquisition Milestones: COBRA Block I: COBRA Block II Milestone B	3	2017	3	2017
Acquisition Milestones: COBRA Block I: LRIP Decision Review Block II	2	2021	2	2021
Test & Evaluation: COBRA Block I: COBRA Block I Techeval	2	2017	2	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 Inc II Testing	4	2017	4	2017
Test & Evaluation: COBRA Block II: COBRA Block II Development Testing	1	2020	4	2021
Production Milestones: COBRA Production (Block I): COBRA Block I	1	2016	4	2017
Production Milestones: COBRA Production (Block II): COBRA Block II LRIP	4	2022	4	2022
Deliveries: COBRA Block I: Block I	1	2016	4	2020
Deliveries: COBRA Block II: Block II	4	2022	4	2022

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603502N / *Surface & Shallow Water MCM*	Project (Number/Name) 2989 / *Barracuda*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2989: *Barracuda*	0.000	0.000	0.000	20.761	-	20.761	33.678	34.769	34.124	39.951	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Barracuda is an expendable mine neutralizer that provides the only unmanned mine neutralization capability to address previously detected near surface mines. These capabilities provide positive identification and recognition of the sea mine threat, reduced mine neutralization mission timelines, and reduced cost to neutralize a mine relative to existing systems. Initial Barracuda deployment will be on the Unmanned Surface Vehicle (USV) as a part of the Mine Countermeasures (MCM) Mission Package (MP). Subsequent plans are to expand potential means of providing in-stride MCM capabilities. Barracuda may be hosted by a Littoral Combat Ship (LCS), Expeditionary Mobile Base (ESB), or shore facility. Barracuda baseline capability is derived from the single sortie detect to engage (SS-DTE) Future Naval Capabilities (FNC) effort. Barracuda addresses unmet requirements in near surface neutralization created the cancellation of the RAMICS program in FY13.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Barracuda: Product Development	0.000	0.000	16.008	0.000	16.008
Articles:	-	-	-	-	-
FY 2016 Accomplishments: N/A					
FY 2017 Plans: Reference PE 0604373N; Barracuda was moved to PE0603502N for FY18 - FY22.					
FY 2018 Base Plans: Complete Barracuda Source Selection and complete contract award. 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), verifying requirements traceability, and preparing for Preliminary Design Review (PDR), which will include component level prototyping and testing to demonstrate risk reduction within the design to be proposed.					
FY 2018 OCO Plans: N/A					
Title: Barracuda: Engineering Support	0.000	0.000	4.467	0.000	4.467
Articles:	-	-	-	-	-
FY 2016 Accomplishments:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 2989 / *Barracuda*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A ***FY 2017 Plans:*** Reference PE 0604373N; Barracuda moved to PE0603502N for FY18 - FY22. ***FY 2018 Base Plans:*** Complete technical development of detailed design and complete source selection. ***FY 2018 OCO Plans:*** N/A					
Title: Barracuda: Management Services ***Articles:*** ***FY 2016 Accomplishments:*** N/A ***FY 2017 Plans:*** Reference PE 0604373N; Barracuda moved to PE0603502N for FY18 - FY22. ***FY 2018 Base Plans:*** Continue to provide program management, financial management, and engineering support. ***FY 2018 OCO Plans:*** N/A	0.000 -	0.000 -	0.286 -	0.000 -	0.286 -
Accomplishments/Planned Programs Subtotals	0.000	0.000	20.761	0.000	20.761

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 0604373N/2473: *Airborne Mine Countermeasures*	0.000	7.610	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	7.610

Remarks

Barracuda FY17 funding in budget PE0604373N and moved to PE0603502N in FY18 - FY22.

D. Acquisition Strategy

Field the baseline system to address near surface portion of water column.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 2989 / *Barracuda*

E. Performance Metrics

Successful fielding of the Barracuda system.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 2989 / *Barracuda*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Barracuda Hardware/ Support	C/CPIF	TBD : TBD	0.000	0.000		0.000		16.008	May 2018	-		16.008	0.000	16.008	-
		Subtotal	0.000	0.000		0.000		16.008		-		16.008	0.000	16.008	-

Remarks

Reference PE0604373N for FY17

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Barracuda Engineering Support	WR	NUWC NPT : Newport, RI	0.000	0.000		0.000		0.544	Dec 2017	-		0.544	Continuing	Continuing	Continuing
Barracuda Engineering Services	C/CPIF	JHU APL : Baltimore, MD	0.000	0.000		0.000		0.668	Dec 2017	-		0.668	Continuing	Continuing	Continuing
Barracuda Engineering Support	WR	NSWC, PC : Panama City, FL	0.000	0.000		0.000		1.241	Dec 2017	-		1.241	Continuing	Continuing	Continuing
Barracuda Support	WR	NSWC, IHD : Indian Head, MD	0.000	0.000		0.000		1.450	Dec 2017	-		1.450	0.000	1.450	-
Barracuda Support	WR	NSWC, PHD : Port Hueneme, CA	0.000	0.000		0.000		0.310	Dec 2017	-		0.310	0.000	0.310	-
Barracuda Support	WR	NSWC, Carderock : Bethesda, MD	0.000	0.000		0.000		0.254	Dec 2017	-		0.254	0.000	0.254	-
		Subtotal	0.000	0.000		0.000		4.467		-		4.467	-	-	-

Remarks

Reference PE0604373N for FY17

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 2989 / *Barracuda*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Barracuda Management Support	WR	NSWC, PC : Panama City, FL	0.000	0.000		0.000		0.286	Dec 2017	-		0.286	0.000	0.286	-
		Subtotal	0.000	0.000		0.000		0.286		-		0.286	0.000	0.286	-

Remarks

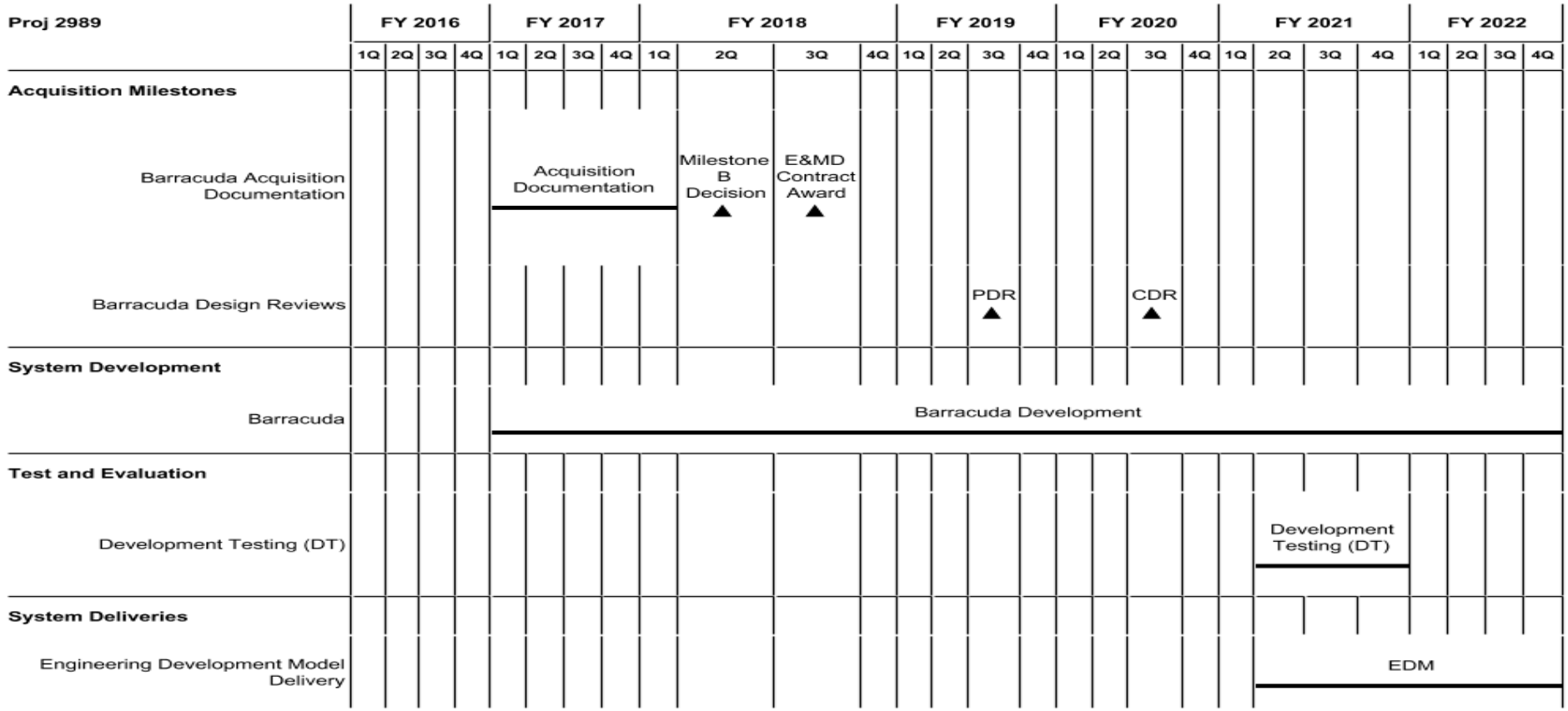
Reference PE0604373N for FY17

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		0.000		20.761		-		20.761	-	-	-

Remarks

Reference PE0604373N for FY17

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 2989 / *Barracuda*



2018PB - 0603502N - 2989

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 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	3	2019	3	2019
Acquisition Milestones: Barracuda Design Reviews: Critical Design Review	3	2020	3	2020
System Development: Barracuda: Barracuda Development	1	2017	4	2022
Test and Evaluation: Development Testing (DT): Development Testing (DT): Development Testing (DT)	2	2021	4	2021
System Deliveries: Engineering Development Model Delivery: Engineering Development Model Delivery	2	2021	4	2022

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603502N / *Surface & Shallow Water MCM*	Project (Number/Name) 3123 / *SMCM UUV*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3123: *SMCM UUV*	120.607	14.923	11.557	25.052	-	25.052	16.717	20.747	21.598	22.031	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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. Potential 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Knifefish SMCM UUV	14.923	11.557	25.052	0.000	25.052
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Continued Engineering and Manufacturing Development (E&MD) phase. Completed initial contractor testing. Started preparation of Milestone C documentation.					
FY 2017 Plans: Continue Contractor Testing (CT) and start initial Developmental Testing (DT). Conduct Engineering Qualification Testing (EQT) and initial risk reduction Launch and Recovery (L&R) testing off of an LCS ship provided ship schedules support.					
FY 2018 Base Plans: Complete CT and conduct Developmental Testing (DT)/Operational Assessment (OA). Achieve Milestone C in 2QFY18 and award initial LRIP contract.. Conduct Pre-Planned Product Improvement (P3I) development efforts to increase sonar range by 3x and lay foundation for additional follow-on P3I efforts (onboard processing, re-acquisition, dual-side sonar, and increased endurance). Component fabrication, testing, and initial integration of Pre-Planned Product Improvement (P3I) efforts to increase sonar range.					
FY 2018 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	14.923	11.557	25.052	0.000	25.052

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 3123 / *SMCM UUV*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• OPN/2622: *Minesweeping Replacement*	21.014	56.675	31.531	-	31.531	45.174	43.084	42.517	43.092	Continuing	Continuing
• OPN/1601: *Enter Other Funding Description.*	67.451	57.146	55.870	-	55.870	73.903	75.373	158.293	188.844	1,406.438	2,165.302

Remarks

Funding displayed on BLIs 2622 and 1601 OPN in total, does not reflect Knifefish OPN dollars.

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. Initial procurement of the SMCM UUV with LFBB begins in FY 2018 after Milestone C with additional procurements in subsequent years.

E. Performance Metrics

Successful Milestone C in 2Q FY 2018.
Reach Initial Operational Capability (IOC) 2Q FY19. Full Rate Production Decision would then follow in 4Q FY19.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 3123 / *SMCM UUV*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 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	Continuing	Continuing	Continuing
Knifefish Development	C/CPIF	Various : Various	17.497	0.000		0.000		0.000		-		0.000	0.000	17.497	-
Knifefish Development	C/CPIF	General Dynamics AIS : McLeansville, NC	58.259	8.865	Dec 2015	7.783	Dec 2016	8.134	Dec 2017	-		8.134	Continuing	Continuing	Continuing
Hardware/Software Development - Support Equipment	WR	NSWC, PC : PANAMA CITY, FL	0.805	1.624	Apr 2016	0.000		0.750	Dec 2017	-		0.750	Continuing	Continuing	Continuing
Knifefish P3I Initial Development Contractor	C/CPIF	GDMS : McLeansville, NC	0.000	0.000		0.000		6.408	Dec 2017	-		6.408	0.000	6.408	-
		Subtotal	91.703	10.489		7.783		15.292		-		15.292	-	-	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering Support	WR	NSWC, PC : PANAMA CITY, FL	14.837	1.932	Dec 2015	1.000	Dec 2016	1.000	Dec 2017	-		1.000	Continuing	Continuing	Continuing
Engineering Support	WR	NUWC, Newport : NEWPORT, RI	4.926	0.802	Dec 2015	0.490	Dec 2016	0.400	Dec 2017	-		0.400	Continuing	Continuing	Continuing
Engineering Support	WR	VARIOUS : VARIOUS	3.699	0.780	Dec 2015	0.940	Dec 2016	1.000	Dec 2017	-		1.000	Continuing	Continuing	Continuing
Engineering Support P3I	WR	NSWC, PC : PANAMA CITY, FL	0.000	0.000		0.000		0.500	Dec 2017	-		0.500	0.000	0.500	-
Engineering Support P3I	WR	NUWC, Newport : NEWPORT, RI	0.000	0.000		0.000		0.250	Dec 2017	-		0.250	0.000	0.250	-
Engineering Support P3I	WR	VARIOUS : VARIOUS	0.000	0.000		0.000		3.800	Dec 2017	-		3.800	0.000	3.800	-
		Subtotal	23.462	3.514		2.430		6.950		-		6.950	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603502N / *Surface & Shallow Water MCM*	Project (Number/Name) 3123 / *SMCM UUV*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 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	Continuing	Continuing	Continuing
Government T&E Support	WR	VARIOUS : VARIOUS	1.213	0.116	Jan 2016	0.150	Jun 2017	0.920	Dec 2017	-		0.920	Continuing	Continuing	Continuing
Test and Evaluation	WR	COMOPTEVFOR : NORFOLK, VA	0.481	0.075	Dec 2015	0.000		0.160	Dec 2017	-		0.160	Continuing	Continuing	Continuing
Government T&E Support	WR	NSWC, PC : PANAMA CITY, FL	0.000	0.449	Dec 2015	0.400	Apr 2017	0.500	Dec 2017	-		0.500	0.000	1.349	-
		Subtotal	2.220	0.640		0.550		1.580		-		1.580	-	-	-

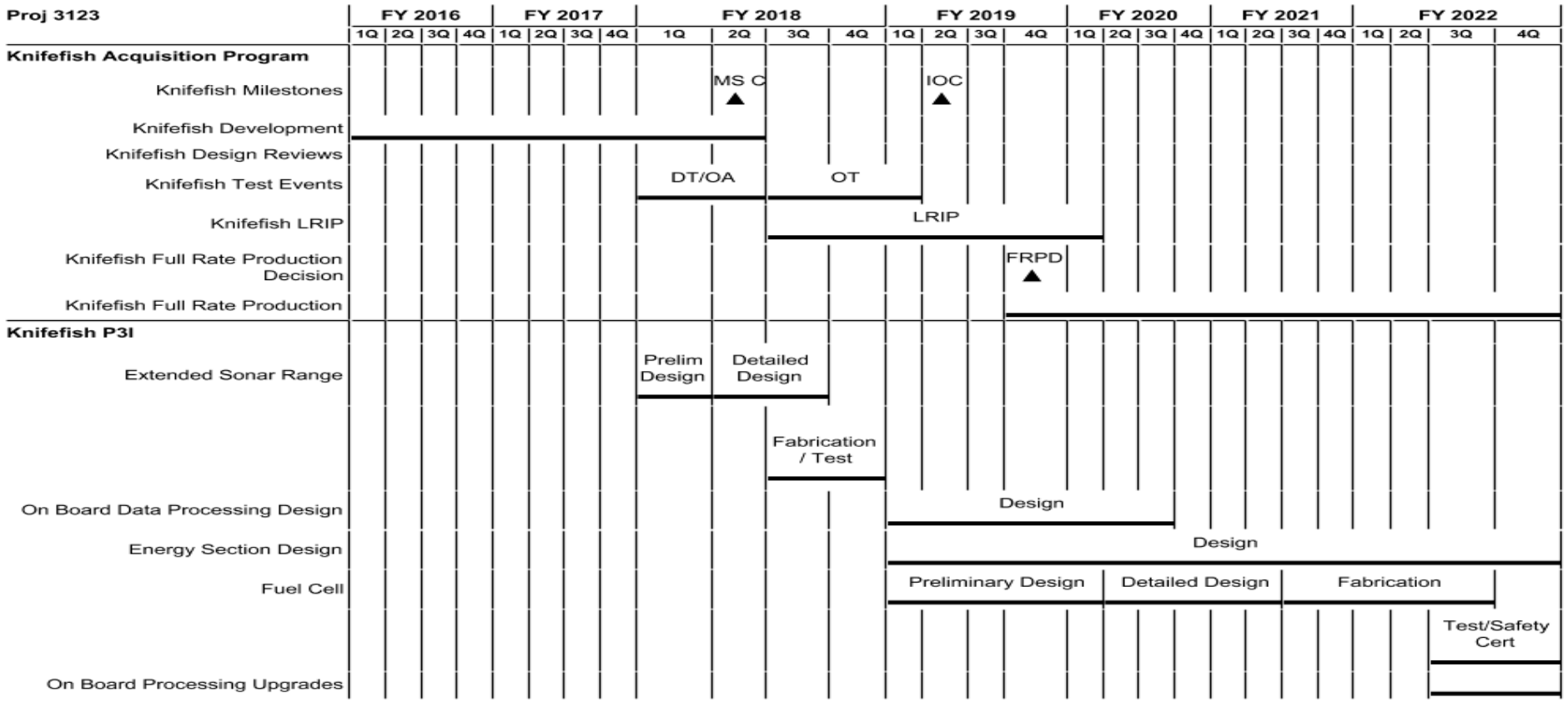
Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	C/CPFF	VARIOUS : WASHINGTON, DC	2.890	0.230	Dec 2015	0.744	Dec 2016	1.105	Feb 2018	-		1.105	Continuing	Continuing	Continuing
Travel	WR	NAVSEA : WNY, DC	0.285	0.050	Dec 2015	0.050	Dec 2016	0.125	Dec 2017	-		0.125	Continuing	Continuing	Continuing
Acquisition Workforce	WR	VARIOUS : VARIOUS	0.047	0.000		0.000		0.000		-		0.000	0.000	0.047	-
		Subtotal	3.222	0.280		0.794		1.230		-		1.230	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	120.607	14.923		11.557		25.052		-		25.052	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 3123 / *SMCM UUV*



2018PB - 0603502N - 3123

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 3123 / *SMCM UUV*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3123				
Knifefish Acquisition Program: Knifefish Milestones: Milestone C	2	2018	2	2018
Knifefish Acquisition Program: Knifefish Milestones: IOC	2	2019	2	2019
Knifefish Acquisition Program: Knifefish Development:	1	2016	2	2018
Knifefish Acquisition Program: Knifefish Test Events: DT/OA	1	2018	2	2018
Knifefish Acquisition Program: Knifefish Test Events: OT	3	2018	1	2019
Knifefish Acquisition Program: Knifefish LRIP:	3	2018	1	2020
Knifefish Acquisition Program: Knifefish Full Rate Production Decision:	4	2019	4	2019
Knifefish Acquisition Program: Knifefish Full Rate Production:	4	2019	4	2022
Knifefish P3I: Extended Sonar Range: Extended Range Prelim Design	1	2018	1	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
Knifefish P3I: On Board Data Processing Design:	1	2019	3	2020
Knifefish P3I: Energy Section Design: Energy Section Design	1	2019	4	2022
Knifefish P3I: Fuel Cell: Fuel Cell Prelim Design	1	2019	1	2020
Knifefish P3I: Fuel Cell: Fuel Cell Detailed Design	2	2020	2	2021
Knifefish P3I: Fuel Cell: Fuel Cell Fabrication	3	2021	3	2022
Knifefish P3I: Fuel Cell: Fuel Cell Test/Safety Cert	3	2022	4	2022
Knifefish P3I: On Board Processing Upgrades: Upgrades	3	2022	4	2022

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603506N *I Surface Ship Torpedo Defense*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	609.863	69.803	87.066	14.974	-	14.974	8.570	21.461	23.761	22.082	Continuing	Continuing
0225: *Surface Ship Torpedo Defense (SSTD)*	609.863	69.803	87.066	14.974	-	14.974	8.570	21.461	23.761	22.082	Continuing	Continuing

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. The TWS and CAT systems make up the Anti-Torpedo Torpedo Defense System (ATTDS). 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.

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 systems were accelerated due to the lack of hard-kill torpedo defense on High Value Units (HVUs). The systems provide a hard-kill torpedo defense capability. The program delivered one hybrid prototype system in FY13 on USS GEORGE HW BUSH. The next prototype was delivered in FY14; this system was delivered in a roll-on/roll-off (RORO) configuration and installed on USS THEODORE ROOSEVELT. The next two installs were one additional RORO (USS EISENHOWER) and one EDM (USS HARRY S TRUMAN) in FY15. The fifth system was purchased in FY16 and has been installed on the USS NIMITZ. Both Roll-On/ Roll-Off systems will be installed on the same CVN's as EDM Systems starting in FY17 and completed by the end of FY18.

Overall, the ATTDS program will continue SALVO EDM Development through FY17. Two independent testing events are planned in 1Q FY18. A Contractor Test (CT-5) is planned and a Quick Reaction Assessment (QRA) is planned for the same at sea event. The QRA is paramount to the program to gain approval to deploy the system with a SALVO Capability and then sustain the existing five CVN installed systems during FY18-FY22. Throughout the period of FY18-FY22, no program of record acquisition milestones will be pursued. Software upgrades, material engineering changes, and safety certifications will remain the program's top priorities to ensure the highest operational availability and performance of the deployed CVN systems.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy					Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*			R-1 Program Element (Number/Name) PE 0603506N *I Surface Ship Torpedo Defense*		
B. Program Change Summary ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**
Previous President's Budget	71.300	87.066	80.573	-	80.573
Current President's Budget	69.803	87.066	14.974	-	14.974
Total Adjustments	-1.497	0.000	-65.599	-	-65.599
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.497	0.000			
• Program Adjustments	0.000	0.000	-65.573	-	-65.573
• Rate/Misc Adjustments	0.000	0.000	-0.026	-	-0.026

Change Summary Explanation

The FY 2016 funding reflects reduction of $1.497 million for SBIR Assessment.

The FY 2018 funding reflects removal of $65.573 million for ATTDS while retaining development and support funding for the five torpedo defense systems currently delivered in the fleet.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603506N / *Surface Ship Torpedo Defense*	Project (Number/Name) 0225 / *Surface Ship Torpedo Defense (SSTD)*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0225: *Surface Ship Torpedo Defense (SSTD)*	609.863	69.803	87.066	14.974	-	14.974	8.570	21.461	23.761	22.082	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Surface Ship Torpedo Defense (SSTD) program provides a layered torpedo defense capability with four efforts; two of which are currently in development. The Countermeasure Anti- Torpedo (CAT) program develops a canisterized Anti-Torpedo Torpedo (ATT). The Torpedo Warning System (TWS) develops the required TDCL systems. The Countermeasure TWS and CAT systems make up the Anti-Torpedo Torpedo Defense System (ATTDS).

The program will develop and field five ATTDS EDM systems on CVNs as part of the rapid fielding effort, two of which were initially delivered in a RORO configuration. The program delivered one hybrid prototype EDM system in FY13 on USS GHW BUSH. The next system was delivered in FY14; this system was delivered in a RORO configuration and installed on USS ROOSEVELT. The program installed one additional RORO (USS EISENHOWER) and one EDM (USS TRUMAN) in FY15. The program completed installation of the fifth ATTDS System on the USS NIMITZ in FY17. Crew training and System 5 operation verification tests will be completed in FY17 prior to the USS NIMITZ deployment. In addition, RORO to EDM conversions on the USS Roosevelt will complete in FY17 and start on the USS EISENHOWER.

Overall, the ATTDS program will complete EDM development and then sustain the existing five CVN installed systems during FY18-FY22. Throughout the period of FY18-FY22, no program of record acquisition milestones will be pursued. Software upgrades, material engineering changes, and safety certifications will remain the programs top priorities to ensure the highest operational availability and performance of the deployed systems. The USS EISENHOWER RORO EDM conversion will complete in FY18.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Countermeasure Anti-Torpedo (CAT)	37.551	38.981	7.000	0.000	7.000
Articles:	-	24	-	-	-
FY 2016 Accomplishments: Completed land based software development and in-water testing of the EDM-2 thermal engine variant. Assembled and delivered CAT systems purchased in FY15. Completed follow-on software development and testing for ATT SALVO capability. Conducted one independent contractor integrated in-water test with TWS system for the development of the initial ATT SALVO Capability to include the build of 11 test assets (6 Thermal / 5 Electric ATTs).					
FY 2017 Plans: Assemble and deliver CATs for fleet use prior to CVN deployment.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603506N / *Surface Ship Torpedo Defense*	**Project (Number/Name)** 0225 / *Surface Ship Torpedo Defense (SSTD)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Complete land based software development for EDM - 2 systems. Plan for a Quick Reaction Assessment (QRA) of the SALVO software in FY18. Conduct land based reliability testing on deployed ATTs. Develop the CAT EX-819 container. Conduct VERTREP qualification testing of the CAT EX-819 container. Conduct engineering changes on CAT materials and CAT software upgrades. Procure Long Lead Material for 24 ATT. ***FY 2018 Base 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 maintenance through Program Trouble Reports (PTRs). Conduct quick reaction Assessment (QRA) of SALVO Software. Conduct CT.5 contractor test. ***FY 2018 OCO Plans:*** N/A					
Title: Torpedo Warning System (TWS)	32.252	48.085	7.974	0.000	7.974
Articles:	1	-	-	-	-
FY 2016 Accomplishments: Installed 2 EDM systems that were purchased in FY 15. Continued land based and in-water integration testing of the TWS and CAT systems. Continued TWS Towed Active Acoustic Source (TAAS) software and hardware development and testing. Accelerated TWS SALVO Capability. Conducted one independent contractor integrated in-water test with the CAT systems for the development of the TWS initial SALVO capability, and demonstration of TAAS performance and reliability. Commence RORO to EDM conversion on CVN71. ***FY 2017 Plans:*** Continue TWS SALVO software refinement. Continue TWS TAAS software, hardware development and refinement testing. Conduct one TWS independent in-water test.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603506N / *Surface Ship Torpedo Defense*	**Project (Number/Name)** 0225 / *Surface Ship Torpedo Defense (SSTD)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Conduct one independent contractor integrated in-water test with CAT system for the development of the initial ATT SALVO Capability. Complete the installation on USS NIMITZ prior to FY17 deployment. Prepare for a Quick Reaction Assessment (QRA) of the SALVO and TAAS software. Commence RORO to EDM conversion on CVN69. Complete RORO to EDM conversion on CVN71. Implement Sympathetic Detonation Reaction mitigation on all CVN Launch Frame Assemblies. ***FY 2018 Base Plans:*** Continue land based reliability testing on returning deployed TWS systems. Continue engineering changes on TWS software upgrades. Perform Safety Certifications prior to two FY18 CVN deployments. Perform system operational verification testing prior to two FY18 CVN deployments. Support software maintenance through Program Trouble Reports (PTRs). Complete RORO to EDM conversion on CVN69. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	69.803	87.066	14.974	0.000	14.974

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• OPN/2213: *SSTD*	8.396	6.893	12.867	-	12.867	11.688	13.659	13.934	14.214	Continuing	Continuing
• WPN/3113: *SSTD*	5.580	5.910	5.240	-	5.240	6.578	6.317	5.926	6.047	Continuing	Continuing

Remarks

D. Acquisition Strategy

CAT Program: In FY09 and FY10, the CAT project completed a Systems Requirements Review (SRR) and Preliminary Design Review (PDR) on the second Engineering Development Model (EDM-2) design. ARL will fabricate test articles and 32 total EDM-2 CATs in support of the five rapid fielding systems. Integration testing began in FY13 and will continue through delivery of the prototype CATs. ARL has completed a Technical Data Package (TDP) that can be used in the future when the CAT program evolves into a Program of Record. Future year funding in FY18 to FY22 will be used to sustain the 32 warhead capable CATs to ensure they are ready for Fleet deployment.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603506N / *Surface Ship Torpedo Defense*	**Project (Number/Name)** 0225 / *Surface Ship Torpedo Defense (SSTD)*

TWS Program: In FY09 and FY10, a towed sensor system specification was developed and two sea tests were conducted on Navy destroyers that demonstrated the ability of three different active and passive sonar ranging techniques and demonstrated the benefit of new torpedo detection sonar waveforms. Data from these tests is being applied to the HVU application, and the sensor specification is being modified to meet the increased capability required for HVU ships. Development and production of the new sensors is being conducted by 3Phoenix. A complete sensor set was delivered in 2nd QTR FY12 to support an at sea test in the 3rd QTR FY12. At the same time, a ready-stowage rack, and fire control systems were being developed by Pacific Engineering Incorporated (PEI) and In-Depth Engineering, respectively. All of these components were brought together for integration in FY13. This integration supported fabrication and fielding of the prototype systems. Future year funding in FY18 to FY22 will be used to sustain TWS to ensure they are ready for Fleet deployment.

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: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603506N / *Surface Ship Torpedo Defense*	Project (Number/Name) 0225 / *Surface Ship Torpedo Defense (SSTD)*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	WR	NUWC : Newport, RI	42.170	2.141	Nov 2015	3.620	Nov 2016	2.400	Nov 2017	-		2.400	Continuing	Continuing	Continuing
Systems Engineering ATT Dev.	C/CPFF	PSU/ARL : State College, PA	259.869	21.147	Dec 2015	22.000	Dec 2016	4.000	Dec 2017	-		4.000	Continuing	Continuing	Continuing
Systems Engineering	C/CPFF	JHU/APL : Baltimore , MD	1.740	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Systems Engineering Warhead Dev.	WR	NSWC : Indian Head, MD	68.155	5.545	Nov 2015	5.512	Nov 2016	1.100	Nov 2017	-		1.100	Continuing	Continuing	Continuing
Systems Engineering	WR	NUWC : Keyport,WA	45.282	8.700	Nov 2015	5.770	Nov 2016	1.000	Nov 2017	-		1.000	Continuing	Continuing	Continuing
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	Continuing	Continuing	Continuing
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	1.713	0.377	Feb 2016	0.340	Feb 2017	0.000		-		0.000	Continuing	Continuing	Continuing
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	9.688	0.177	Nov 2015	0.167	Nov 2016	0.000		-		0.000	0.000	10.032	Continuing
Systems Engineering TDCL	WR	SPAWAR : San Diego, CA	8.987	1.161	Dec 2015	1.485	Dec 2016	0.000		-		0.000	Continuing	Continuing	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	13.741	1.117	Dec 2015	0.000	Dec 2016	0.000		-		0.000	Continuing	Continuing	Continuing
Systems Engineering	WR	NUWC DET : Norfolk, VA	26.023	7.158	Dec 2015	8.206	Dec 2016	0.000		-		0.000	Continuing	Continuing	Continuing
Systems Development	C/CPFF	3 Phoenix : Fairfax, VA	85.294	18.251	Dec 2015	19.400	Dec 2016	3.974	Dec 2017	-		3.974	Continuing	Continuing	Continuing
Integrated Logistic Spt	WR	NSWC Crane : Crane, IN	0.934	0.130	Dec 2015	0.049	Dec 2016	0.000		-		0.000	0.000	1.113	Continuing
Systems Engineering	C/CPFF	PEI : Roca, NE	2.894	0.851	Dec 2015	1.200	Dec 2016	0.000		-		0.000	0.000	4.945	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603506N / *Surface Ship Torpedo Defense*	**Project (Number/Name)** 0225 / *Surface Ship Torpedo Defense (SSTD)*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	WR	CARDEROCK : Bethesda, MD	1.077	0.258	Dec 2015	0.285	Dec 2016	0.000		-		0.000	0.000	1.620	-
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	-
CAT Proof of Manufacturing	C/CPFF	TBD : TBD	0.000	0.000		15.513	Mar 2017	0.000		-		0.000	0.000	15.513	-
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	0.000		0.140	Dec 2016	0.000		-		0.000	0.000	0.140	-
Systems Engineering	WR	NORFOLK SHIPYARD : Norfolk, VA	0.000	0.000		0.204	Dec 2016	0.000		-		0.000	0.000	0.204	-
Systems Engineering	WR	NORFOLK PLANNING YARD : Norfolk, VA	0.000	0.000		0.090	Dec 2016	0.000		-		0.000	0.000	0.090	-
		Subtotal	587.583	67.013		83.981		12.474		-		12.474	-	-	-

Remarks

The key events driving the funding request in FY18 are the sustainment of the five torpedo defense systems currently delivered to the fleet. Funding will support engineering changes needed to take corrective actions on failed operational systems.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603506N / *Surface Ship Torpedo Defense*	Project (Number/Name) 0225 / *Surface Ship Torpedo Defense (SSTD)*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 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
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	0.944	0.100	Nov 2015	0.100	Nov 2016	0.100	Nov 2017	-		0.100	Continuing	Continuing	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	7.298	2.690	Feb 2016	2.985	Feb 2017	2.400	Feb 2018	-		2.400	Continuing	Continuing	Continuing
Program Management Support	C/CPAF	Alion : Washington, DC	0.400	0.000		0.000		0.000		-		0.000	0.000	0.400	-
		Subtotal	22.280	2.790		3.085		2.500		-		2.500	-	-	-

Remarks

FY18 travel to support the five torpedo defense systems currently in the fleet. FY18 program management support includes FY18 costs to continue subject matter expert support throughout the FY as the program transitions to retaining development for the five torpedo defense systems in the fleet.

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	609.863	69.803		87.066		14.974		-		14.974	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603506N / *Surface Ship Torpedo Defense*	**Project (Number/Name)** 0225 / *Surface Ship Torpedo Defense (SSTD)*

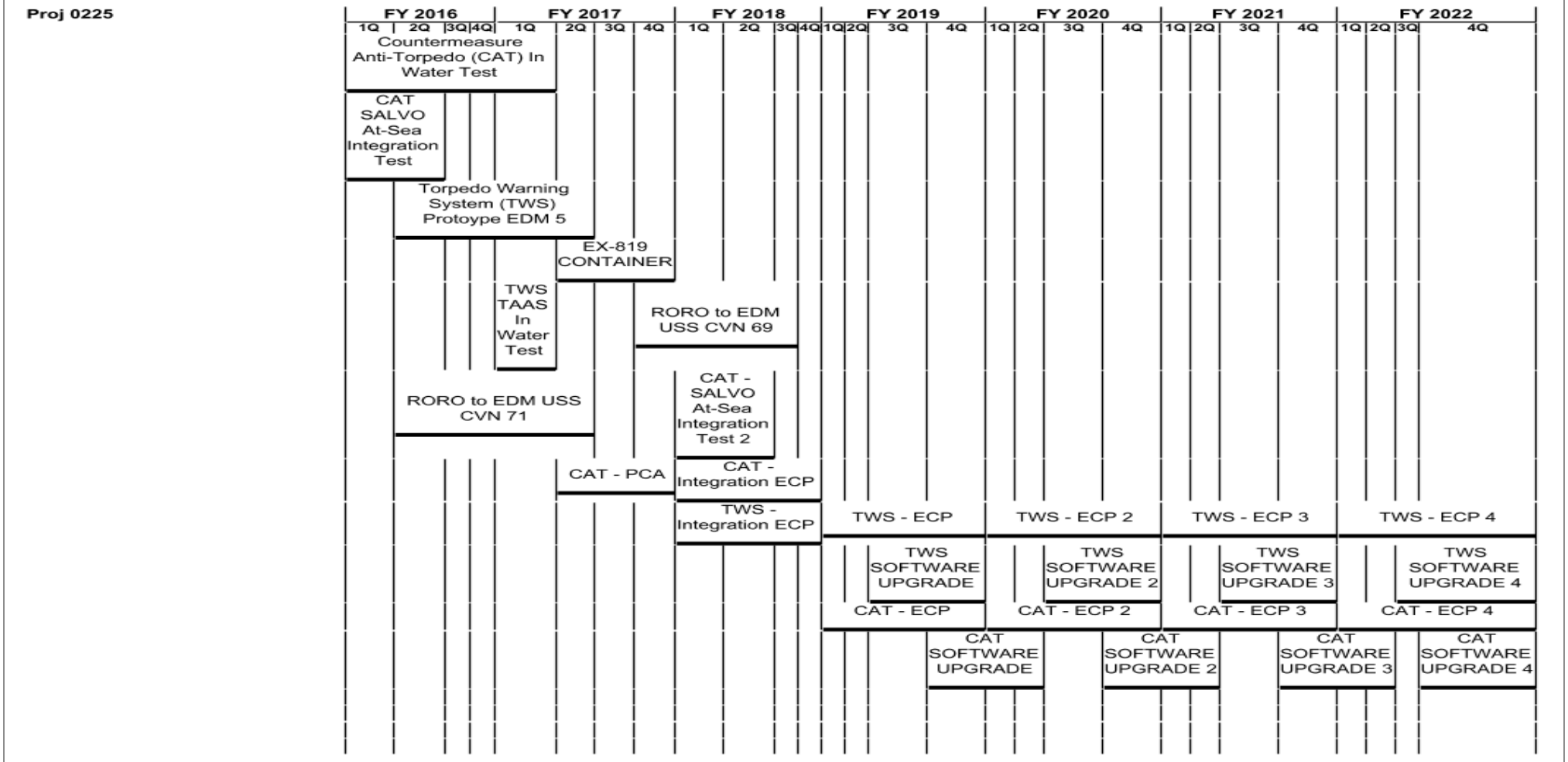


Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603506N / *Surface Ship Torpedo Defense*	**Project (Number/Name)** 0225 / *Surface Ship Torpedo Defense (SSTD)*

2018OSD - 0603506N - 0225

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603506N / *Surface Ship Torpedo Defense*	**Project (Number/Name)** 0225 / *Surface Ship Torpedo Defense (SSTD)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 0225				
Countermeasure Anti-Torpedo (CAT) - In Water Test	1	2016	1	2017
CAT - SALVO At-Sea Integration Test	1	2016	2	2016
Torpedo Warning System (TWS) - (EDM) 5	2	2016	2	2017
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
RORO to EDM USS CVN 71	2	2016	2	2017
CAT - SALVO At-Sea Integration Test 2	1	2018	2	2018
CAT - Integration ECP	1	2018	4	2018
CAT - PCA	2	2017	4	2017
TWS - Integration ECP	1	2018	4	2018
TWS - ECP	1	2019	4	2019
TWS - ECP 2	1	2020	4	2020
TWS - ECP 3	1	2021	4	2021
TWS - ECP 4	1	2022	4	2022
TWS SOFTWARE UPGRADE	3	2019	4	2019
TWS SOFTWARE UPGRADE 2	3	2020	4	2020
TWS SOFTWARE UPGRADE 3	3	2021	4	2021
TWS SOFTWARE UPGRADE 4	3	2022	4	2022
CAT - ECP	1	2019	4	2019
CAT - ECP 2	1	2020	4	2020

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603506N / *Surface Ship Torpedo Defense*	**Project (Number/Name)** 0225 / *Surface Ship Torpedo Defense (SSTD)*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
CAT - ECP 3	1	2021	4	2021
CAT - ECP 4	1	2022	4	2022
CAT SOFTWARE UPGRADE	4	2019	2	2020
CAT SOFTWARE UPGRADE 2	4	2020	2	2021
CAT SOFTWARE UPGRADE 3	4	2021	2	2022
CAT SOFTWARE UPGRADE 4	4	2022	4	2022

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603512N *I Carrier Systems Development*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	53.431	8.213	7.605	9.296	-	9.296	5.918	5.778	5.904	6.024	Continuing	Continuing
3216.: *Tactical Support Center-Integration*	30.853	5.996	7.032	7.636	-	7.636	4.348	4.443	4.538	4.629	Continuing	Continuing
4005: *In-Service Carrier Systems Development*	22.578	2.217	0.573	1.660	-	1.660	1.570	1.335	1.366	1.395	Continuing	Continuing

A. Mission Description and Budget Item Justification

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, Carrier-Based Aerial Refueling System (CBARS), Triton, and future ASW/SUW aircraft.

Beginning in FY16, Project 3216 is supporting the design and development of a multi-application, cross-platform boundary 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: FY 2018 Navy					Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*			R-1 Program Element (Number/Name) PE 0603512N *I Carrier Systems Development*		
B. Program Change Summary ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**
Previous President's Budget	8.348	7.605	9.283	-	9.283
Current President's Budget	8.213	7.605	9.296	-	9.296
Total Adjustments	-0.135	0.000	0.013	-	0.013
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.135	0.000			
• Rate/Misc Adjustments	0.000	0.000	0.013	-	0.013

Change Summary Explanation

Funding:
FY 2016: Funding was decreased by $0.135M for SBIR.

Project 3216: CV-TSC Build nomenclature has been updated from Build 8/9/10 to Fleet Capability Release (FCR 1/2/3/etc.).

Project 4005: FY 17 projects include: LPAP On-Machine I/O, LPAP air end redesign, Modular Reefer Unit and PCMS alternate measurement capability. Additional FY18 projects planned include: completion of LPAP On-Machine I/O and LPAP air end redesign. Start of C4I networks performance reqmts modeling and analysis, Network Data Logger Device, ICAS SE improvements, Chlorinator/Dechlorinator Reliability improvements, Portable Navigation/ship control data analyzer, CVN 78 CL Platform support for JSF.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603512N / *Carrier Systems Development*	Project (Number/Name) 3216. / *Tactical Support Center-Integration*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3216.: *Tactical Support Center-Integration*	30.853	5.996	7.032	7.636	-	7.636	4.348	4.443	4.538	4.629	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, CBARS, 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: 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: CV-TSC Development / Integration / Test / Certification	4.040	3.780	4.222	0.000	4.222
Articles:	-	-	-	-	-
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).					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603512N / *Carrier Systems Development*	**Project (Number/Name)** 3216. / *Tactical Support Center-Integration*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
FY 2016 Accomplishments: - Completed development of initial release of CV-TSC Build 8.0 software version FCR-1, which provided architectural changes enabling the phased FCR plan to provide incremental software releases with capability updates and cyber-security patches. - Completed certifications required for fielding CV-TSC Build 8.0 software version FCR-1, to include Information Assurance (IA) Accreditation, Integrated Shipboard Network System (ISNS) and Consolidated Afloat Networks and Enterprise Services (CANES) Certifications, and PEO IWS Element Certification. - Conducted incremental requirements, design, and test reviews of FCR-1. - Conducted Combat System Test (CST) certification event of FCR-1 for CVN-72. - Began development of CV-TSC Build 8.0 software version FCR-2. ***FY 2017 Plans:*** - Complete development of CV-TSC Build 8.0 software version FCR-2, with a focus on capability improvements to Public Key Enforcement (PKE) compliance, interoperability with multiple variants of SSDS and the Common Data Link System (CDLS). - Conduct incremental requirements, design, and test reviews of FCR-2. - Complete certifications required for fielding CV-TSC software version FCR-2, to include IA Accreditation, ISNS and CANES Certifications, PEO IWS Element Certification, and CST Certification. - Conduct CST event of FCR-2 for CVN-78 (4Q17). - Begin development on CV-TSC Build 8.0 software version FCR-3. - Conduct incremental requirements, design, and test reviews of FCR-3. ***FY 2018 Base Plans:*** - Continue development on CV-TSC Build 8.0 software version FCR-3. - Continue incremental requirements, design, and test reviews of FCR-3. - Update System Engineering Plan (SEP). - Transition requirements into a systems engineering modeling tool. - Modify interface requirement specifications for changing interfaces. - Transition Information Assurance (IA) Accreditation to Risk Management Framework (RMF). ***FY 2018 OCO Plans:*** N/A					
Title: NAVSEA Boundary Defense Capability (Cybersecurity)	1.956	3.252	3.414	0.000	3.414
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603512N / *Carrier Systems Development*	**Project (Number/Name)** 3216. / *Tactical Support Center-Integration*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
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 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.). 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. ***FY 2016 Accomplishments:*** - Designed and developed multi-application, cross-platform boundary defense strategies including a strategy to minimize, consolidate, and disconnect connections between the NAVSEA enclaves (Weapons, HM&E, and NAVSEA Navigation Systems), SPAWAR and NAVAIR enclaves. In support of NAVSEA Commander's Intent requirements, issued technically approved cyber security updates to in-service NAVSEA system tech manuals and developed operating, casualty, and maintenance procedures for systems directly interfacing with the GIG. Commenced development of cyber security Ship Change Documents (SCDs). ***FY 2017 Plans:*** Continue design and development of multi-application, cross-platform cybersecurity solutions for control system enclaves, followed by engineering for CVN 68 Class integration. - non-recurring engineering efforts for HM&E Control Systems. - Perform engineering and planning for Boundary Defense Capability Temporary Alterations. - Develop infra-structure, processes and procedures in support of Risk Management Framework (RMF) and Cybersafe. - Perform system change engineering and analysis for upgrading systems to supported operating systems.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603512N / *Carrier Systems Development*	**Project (Number/Name)** 3216. / *Tactical Support Center-Integration*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Develop Cybersecurity Situational Awareness strategy for CVN 68 Class ***FY 2018 Base Plans:*** Continue design and development of multi-application, cross-platform cybersecurity solutions for control system enclaves, followed by engineering for CVN 68 Class integration. - Initiate non-recurring engineering efforts for HM&E Control Systems. - Perform engineering and planning for Boundary Defense Capability Temporary Alterations. - Develop infra-structure, processes and procedures in support of Risk Management Framework (RMF) and Cybersafe. - Perform system change engineering and analysis for upgrading systems to supported operating systems. - Develop Cybersecurity Situational Awareness strategy for CVN 68 Class ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	5.996	7.032	7.636	0.000	7.636

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• OPN/2176: *Undersea Warfare Support Equipment (N98/CV-TSC only)*	0.336	0.315	0.338	-	0.338	0.341	0.349	0.357	0.364	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):

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603512N / *Carrier Systems Development*	**Project (Number/Name)** 3216. / *Tactical Support Center-Integration*

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-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603512N / *Carrier Systems Development*	Project (Number/Name) 4005 / *In-Service Carrier Systems Development*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
4005: *In-Service Carrier Systems Development*	22.578	2.217	0.573	1.660	-	1.660	1.570	1.335	1.366	1.395	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,

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: In-Service Carrier Systems Development	2.217	0.573	1.660	0.000	1.660
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Fiscal Year 2016 plans included 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. Projects completed include Legacy Steering Interface Upgrade and Ship Control System (SCS) Onboard trainer.					
FY 2017 Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603512N / *Carrier Systems Development*	**Project (Number/Name)** 4005 / *In-Service Carrier Systems Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Fiscal Year 2017 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 2018 Base Plans:*** 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 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	2.217	0.573	1.660	0.000	1.660

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.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603525N *I (U)PILOT FISH*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	0.000	124.194	132.068	132.083	-	132.083	125.290	158.511	157.965	128.072	Continuing	Continuing
0428: *Pilot Fish*	0.000	124.194	132.068	132.083	-	132.083	125.290	158.511	157.965	128.072	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	122.939	132.068	111.503	-	111.503
Current President's Budget	124.194	132.068	132.083	-	132.083
Total Adjustments	1.255	0.000	20.580	-	20.580
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	5.100	0.000			
• SBIR/STTR Transfer	-3.845	0.000			
• Rate/Misc Adjustments	0.000	0.000	20.580	-	20.580

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603527N *I (U)RETRACT LARCH*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	0.000	39.475	50.453	15.407	22.000	37.407	8.135	8.343	8.475	8.627	Continuing	Continuing
2690: *Retract Larch*	0.000	39.475	50.453	15.407	22.000	37.407	8.135	8.343	8.475	8.627	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	28.803	14.546	7.699	-	7.699
Current President's Budget	39.475	50.453	15.407	22.000	37.407
Total Adjustments	10.672	35.907	7.708	22.000	29.708
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	11.483	0.000			
• SBIR/STTR Transfer	-0.811	0.000			
• Program Adjustments	0.000	35.907	7.521	-	7.521
• Rate/Misc Adjustments	0.000	0.000	0.187	22.000	22.187

Change Summary Explanation

Technical: Not applicable.

Schedule: Not applicable.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603536N *I (U)RETRACT JUNIPER*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	0.000	109.786	115.435	122.413	-	122.413	118.730	104.203	106.277	108.362	Continuing	Continuing
4016: *Retract Sycamore*	0.000	109.786	115.435	122.413	-	122.413	118.730	104.203	106.277	108.362	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	112.604	115.435	123.264	-	123.264
Current President's Budget	109.786	115.435	122.413	-	122.413
Total Adjustments	-2.818	0.000	-0.851	-	-0.851
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-2.818	0.000			
• Program Adjustments	0.000	0.000	-0.140	-	-0.140
• Rate/Misc Adjustments	0.000	0.000	-0.711	-	-0.711

Change Summary Explanation

Technical: Not applicable.

Schedule: Not applicable.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603542N *I Radiological Control*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	16.707	0.709	0.702	0.745	-	0.745	0.762	0.775	0.790	0.805	Continuing	Continuing
1830: *RADIAC Development*	16.707	0.709	0.702	0.745	-	0.745	0.762	0.775	0.790	0.805	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 work. 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: FY 2018 Navy					Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*		R-1 Program Element (Number/Name) PE 0603542N / *Radiological Control*			
B. Program Change Summary ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**
Previous President's Budget	0.710	0.702	0.737	-	0.737
Current President's Budget	0.709	0.702	0.745	-	0.745
Total Adjustments	-0.001	0.000	0.008	-	0.008
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.001	0.000			
• Rate/Misc Adjustments	0.000	0.000	0.008	-	0.008

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603542N / *Radiological Control*	Project (Number/Name) 1830 / *RADIAC Development*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
1830: *RADIAC Development*	16.707	0.709	0.702	0.745	-	0.745	0.762	0.775	0.790	0.805	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.

The AN/PDR-65 Ship Board Monitoring System is obsolete and will be replaced. The IM-239/WDQ Air Particle Detector (APD) and the HD-732, HD-1150 and HD-1151 Air Particle Samplers (APS) are obsolete and will be replaced.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Calibrators	0.063	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Description: Calibrators (also called irradiators) are the basic tool used to calibrate all Navy radiological detection equipment. Essentially they consist of a high energy radiological source (e.g., Cs-137) in a shielded container that is located in a specially constructed room, or "range." A technician places the instrument to be calibrated at a specific calibration point in the range and remotely operates the calibrator by raising the source out of its container so that it irradiates the object instrument. The instrument's response to the radiation is measured so that it can be calibrated to specific tolerances. The current suite of AN/UDM-1B calibrators is over 20 years old and the natural decay of the strength of the radioactive source over time restricts calibration effectiveness by limiting the scale of calibration points below American National Standards Institute (ANSI) requirements that are followed in accordance with Navy policy. Also due to the age of the calibrators, there are several parts no longer supported by the manufacturer, and a malfunctioning calibrator poses a very high safety risk. COTS equipment will be surveyed to find the best solution with which to equip the Navy's seven RADIAC Calibration Laboratories with modern calibrators. ***FY 2016 Accomplishments:*** In addition to making site visits to NSWCCD, the RCSP visited Hopewell Designs, Inc. to gain a detailed engineering understanding of the GC-60 irradiator. The information obtained during the site visits aided in determining the feasibility of the GC-60 as a suitable irradiator for RADIAC calibration purposes. The RCSP submitted a technical memorandum detailing the work performed to date and recommended follow-on actions and/or procurement options. This project completed ahead of schedule in FY16 and the project moved into the acquisition phase. ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A					
Title: Tritium Monitor	0.059	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: The AN/PDR-73 Tritium Monitor is used at nuclear weapons storage facilities and research laboratories to sample the air for the presence of Tritium. The current instrument is 30 years old and cannot					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
be repaired due to obsolete components. At the current loss rate due to normal wear and tear there will be insufficient assets to meet operational requirements, so a replacement must be found. ***FY 2016 Accomplishments:*** Gathered end user feedback and worked with NAVSEA engineer staff to develop specification for procurement. Submitted the specification to NAVSEA 04ND and Strategic Systems Program end user for concurrence. This project moved into the acquisition phase. ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A					
Title: Air Particle Detector	0.069	0.000	0.000	0.000	0.000
Articles:	1	-	-	-	-
Description: The Surface Warfare Enterprise has requested an air sampling system be developed subsequent to the lessons learned from the Japanese Fukishima nuclear reactor accident. U.S. Navy ships sailed unknowingly into plumes of radioactive material released from the damaged nuclear reactors. The ships were widely contaminated and personnel were exposed to radioactive material. The Air Particle Detector (APD) would continuously monitor for airborne radioactive contaminants and provide a real-time measurement at designated locations on the ship with appropriate alarm indications when safe exposure thresholds have been surpassed. ***FY 2016 Accomplishments:*** Based on the information obtained during the discussions with OPNAV and ship visits, NSWCCD formulated a preliminary air sampling system that meets the key performance parameters. The preliminary plan, along with retrofitting information, was circulated to NAVSEA 04ND, OPNAV and end users for feedback. Upon receipt of feedback, the project was determined to be unsuitable for further development. ***FY 2017 Plans:***					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A					
Title: Naval Academy Midshipman Summer Internship ***Articles:*** ***Description:*** Every summer a Midshipman is selected to conduct laboratory studies in support of the Naval Dosimetry System to research various responses and issues with thermoluminescent dosimetry. Funds pay for materials and Midshipman's travel expenses to present his/her findings to the annual Health Physics Society conference. ***FY 2016 Accomplishments:*** Accomplished study assigned by Naval Academy instructor. ***FY 2017 Plans:*** Accomplish study assigned by Naval Academy instructor. ***FY 2018 Base Plans:*** Accomplish study assigned by Naval Academy instructor. ***FY 2018 OCO Plans:*** N/A	0.015 -	0.015 -	0.015 -	0.000 -	0.015 -
Title: Primary Dosimetry ***Articles:*** ***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	0.164 20	0.288 1	0.092 1	0.000 -	0.092 1

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
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. ***FY 2016 Accomplishments:*** Acquired 10 Instadose II Dosimeters and Reader. The Instadose II is the newest version of the Direct Ion Storage (DIS) Dosimeter that has the capability of detecting shallow dose and deep dose from photon (possibly neutrons). Tested this system to the ANSI-N13.11 Standard. The Instadose II under went proficiency-type tests utilizing the sources located at NSWCCD. A Technical Memorandum was developed and provided as a deliverable. ***FY 2017 Plans:*** NSWCCD and the Naval Dosimetry Center (NDC) will complete the pilot study with Landauer dosimetry and submit a Technical Memorandum summarizing the results to SEA 04ND. NSWCCD and NDC will then plan and conduct a repeat of the study using BeO dosimetry. The BeO system will be proficiency tested to the ANSI-N13.11 Standard using radiation sources at NSWCCD, and a similar field evaluation will be conducted at one or more Navy medical facilities. NSWCCD will submit a Test Plan to SEA 04ND for approval. The Test Plan will cover not only all of the specification testing but the dual badging studies as well. Also, NSWCCD will submit a contract package for and procure a Freiberg Lexsyg research imaging TL-OSL-RF system for additional dosimeter material analysis. ***FY 2018 Base Plans:*** 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 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. ***FY 2018 OCO Plans:*** N/A					
Title: Secondary Dosimetry	0.074	0.219	0.125	0.000	0.125
Articles:	18	3	-	-	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total

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 such as the existing Mk2.

FY 2016 Accomplishments:
Initiated and completed testing of extremity and lens secondary dosimetry. Researched applications and end-users of this type of secondary dosimetry within the Navy. Tested acquired dosimetry for dose accuracy, precision and energy dependence. Analyzed applicability to Navy operations and the potential to militarize this type of dosimetry.

FY 2017 Plans:
NSWCCD will submit a Test Plan to Naval Sea Systems Command (NAVSEA 04ND) for evaluation of the extremity secondary dosimetry units, with focus on dose accuracy, precision and energy dependence, in accordance with the American National Standards Institute (ANSI) N13.32 standard. NSWCCD will report on the test results through a Technical Memorandum to NAVSEA 04ND. NSWCCD will also utilize a 3D scanner to evaluate, model and build, using additive manufacturing, components of active dosimeters to meet fleet requirements. The scanner will also be used to develop and deploy a mock-up of the Electronic Personal Dosimeter (EPD-Mk2) to serve as a caddy for the battlefield dosimeter during exposures in the EPD neutron irradiator. Neutron exposures will be a part of acceptance testing quality control. NSWCCD will prepare and submit a contract package to purchase additional extremity dosimetry articles, as well as commercial criticality dosimeters for test and evaluation.

FY 2018 Base Plans:
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.

FY 2018 OCO Plans:

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A					
Title: Radiological Detection System	0.119	0.060	0.140	0.000	0.140
Articles:	-	-	-	-	-

Description: The Radiological Detection System (RDS) is a survey meter, its associated probes for detecting the various types of radiation, and ancillary equipment. This type of survey meter system has many applications and 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 an RDS for use by all the Services. If all the Services could agree on a single system, it would lower the procurement cost for all the Services, and even more importantly enable Joint interoperability in the warfighter Radiological Defense arena, a capability that is currently lacking. However, 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 end uses, Navy must ensure the performance and specifications of a Joint solution would be sufficient for Naval Reactors and the NNPP application.

FY 2016 Accomplishments:
Continued evaluating the RDS for Navy end uses. Additional product demonstrations were provided as needed. Potential fielding strategies were investigated for Radiological Affairs Support Office (RASO) and Radiological Defense (RD) end users. Additional research was performed in assessing the RDS capability in meeting NNPP requirements. Site visits to the Corporate Radiation Health Branch at the Norfolk Naval Shipyard were conducted to aid in the NNPP assessment.

FY 2017 Plans:
NSWCCD will continue coordinating with JPEO-CBND in RDS related activities to represent Navy interests. NSWCCD will stay up to date on the JPEO-CBND acquisition status and relay information to NAVSEA 04ND as appropriate.

FY 2018 Base Plans:
NSWCCD will continue coordinating with JPEO-CBND in RDS related activities. NSWCCD will stay up to date on the JPEO acquisition status and relay information to NAVSEA 04ND as appropriate. NSWCCD may assist with product sample testing, if required. Potential fielding strategies will be investigated for some Navy end users.

FY 2018 OCO Plans:

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A					
Title: Radiological Shipboard Defense Monitor	0.069	0.080	0.076	0.000	0.076
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 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.

FY 2016 Accomplishments:
Based on the information obtained during the discussions with OPNAV and ship visits, NSWCCD formulated a preliminary system that meets the key requirements. The preliminary plan was circulated to NAVSEA 04ND, OPNAV and end users for feedback. A technical specification and implementation plan was developed based on comments on the preliminary system. Market research was performed as requirements were provided by OPNAV and end users.

FY 2017 Plans:
NSWCCD will assist in documenting the RSDM requirement. Market research will be continuously performed as requirements are provided by OPNAV and end users. NSWCCD, with NAVSEA 04ND, will initiate discussions with OPNAV to determine the necessary detection capabilities, types of radiation to be detected, locations to be monitored and shipboard networking capabilities. NSWCCD, in conjunction with OPNAV, may coordinate and conduct two FY17 ship visits to witness the existing infrastructure and obtain end-user input on installing a new system. Additionally, NSWCCD will perform ongoing market research based on updated requirements from OPNAV and end users. NSWCCD will submit a Technical Memorandum (TM) to the Program Office, summarizing current commercial technical capabilities in relation to end user requirements and limitations. The TM will be coupled with a letter to SEA 04ND, recommending next actions.

FY 2018 Base Plans:
NSWCCD will continue to assist in documenting the RSDM requirement. Based on the information obtained during the discussions with OPNAV and ship visits, NSWCCD will formulate a preliminary system that meets the key requirements and features. The preliminary plan will be circulated to SEA 04ND, OPNAV and end

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
users for feedback. Additional ship visits may be necessary to clarify aspects of the preliminary system. A technical specification and implementation plan will be developed based on comments on the preliminary system. NSWCCD will compile all technical requirements, limitations and end-user feedback to date. NSWCCD will then solicit updated feedback from OPNAV and end-users regarding the planned RSDM. ***FY 2018 OCO Plans:*** N/A					
Title: Visit, Board, Search & Seizure	0.077	0.040	0.112	0.000	0.112
Articles:	-	-	6	-	6
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 to ensure they are not being exposed to dangerous levels of radioactivity. 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. ***FY 2016 Accomplishments:*** Continued testing of previously purchased units. Continued market research on evolving technology applicable to VBSS, particularly in radioisotope identification. Developed a Technical Report on the latest VBSS technology based on the results from testing and evaluation to keep the Navy abreast of technological evolution in this area. ***FY 2017 Plans:*** NSWCCD, in conjunction with the RADIAC In Service Engineering Agent, will complete a survey of end-users of the AN/PDX-1 Set regarding the status of the Set components. NSWCCD will compile feedback on any existing or foreseen technical issues, including life cycle data, with these components. This information will be used to					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
begin market research into updated commercial capabilities and to develop a Test Plan. NSWCCD will use all information collected to develop a specification for purchasing commercial PRDs and HRMs suitable for VBSS applications, for test and evaluation. A procurement package will be prepared for FY18 solicitation. ***FY 2018 Base Plans:*** 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. ***FY 2018 OCO Plans:*** N/A					
Title: Telescoping Rate Meter ***Articles:*** ***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 are As Low As Reasonably Achievable (ALARA). The current instrument is 30 years old and approaching obsolescence due to the unavailability of repair parts. ***FY 2016 Accomplishments:*** N/A ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:***	0.000 -	0.000 -	0.185 9	0.000 -	0.185 9

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
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 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 meters units for evaluation. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.709	0.702	0.745	0.000	0.745

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• OPN 2920: *RADIAC*	8.294	9.558	10.177	-	10.177	0.000	0.000	0.000	0.000	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

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603553N *I Surface ASW*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	184.805	1.056	1.081	1.136	-	1.136	1.159	1.183	1.206	1.231	Continuing	Continuing
1704.: *Undersea Warfare*	184.805	1.056	1.081	1.136	-	1.136	1.159	1.183	1.206	1.231	Continuing	Continuing

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. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	1.096	1.081	1.148	-	1.148
Current President's Budget	1.056	1.081	1.136	-	1.136
Total Adjustments	-0.040	0.000	-0.012	-	-0.012
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.040	0.000			
• Program Adjustments	0.000	0.000	-0.004	-	-0.004
• Rate/Misc Adjustments	0.000	0.000	-0.008	-	-0.008

Change Summary Explanation

Funding:
FY 2016: Decrease by $0.040M for Small Business Innovative Research (SBIR) realignment.

YEAR-TO-YEAR OVERALL BUDGET CONTROL INCREASES/DECREASES:

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
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- FY 2017 to FY 2018 increase representative of reasonable inflation escalation associated with the RDT&E,N appropriation.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603553N / *Surface ASW*	Project (Number/Name) 1704. / *Undersea Warfare*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
1704.: *Undersea Warfare*	184.805	1.056	1.081	1.136	-	1.136	1.159	1.183	1.206	1.231	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: ASW Concept Development/Studies	1.056	1.081	1.136	0.000	1.136
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Collected systems and performance data during select Fleet exercises and at-sea testing events. Analyzed and distributed collected data. Conducted studies and Analysis of Alternatives (AoA) in support of improved ASW operations. Developed enhancements to Continuous Active Sonar (CAS) to improve AN/SQQ-89A(V)15 ability to detect, classify, and localize submerged contacts.					
FY 2017 Plans: Collect systems and performance data during select Fleet exercises and at-sea testing events. Analyze and distribute collected data. Conduct studies and AoA in support of improved ASW operations. Award, via Broad Agency Announcement (BAA), an advanced development contract to prototype promising new concepts applying Doppler Matched Processing techniques to ASW operations and Torpedo Defense.					
FY 2018 Base Plans: 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					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603553N / *Surface ASW*	**Project (Number/Name)** 1704. / *Undersea Warfare*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
development efforts initiated in FY17 to prototype promising new ASW concepts applying Doppler Matched Processing techniques to ASW and Torpedo Defense. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	1.056	1.081	1.136	0.000	1.136

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• RDTEN/0205620N/1916: *Surface ASW System Improvement*	23.685	24.583	29.351	-	29.351	28.945	30.213	29.892	30.407	Continuing	Continuing
• OPN/2136: *AN/SQQ-89 Surf ASW Cmbt Sys*	103.241	90.029	102.222	-	102.222	123.433	124.567	127.598	135.209	Continuing	Continuing

Remarks

D. Acquisition Strategy

Use competitively awarded contracts from Broad Agency Announcement (BAA) solicitations and University Affiliated Research Centers (UARCs).

E. Performance Metrics

Investigate promising ASW technologies via the ACB Four Step spiral development/improvement process.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy												Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603561N *I Advanced Submarine System Development*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	893.308	85.496	106.365	100.955	-	100.955	114.588	121.477	106.198	107.488	Continuing	Continuing
0223: *Sub Combat System Improvement (ADV)*	448.761	37.207	42.296	40.828	-	40.828	51.417	50.693	51.754	52.796	Continuing	Continuing
2033: *Adv Submarine Systems Development*	444.547	38.634	55.677	35.795	-	35.795	34.828	35.419	36.164	36.880	Continuing	Continuing
2096: *Payload Delivery Development*	0.000	0.000	8.392	15.738	-	15.738	19.889	26.622	9.391	8.749	Continuing	Continuing
3391: *SSN/SSGN Survivability Program*	0.000	0.000	0.000	8.594	-	8.594	8.454	8.743	8.889	9.063	Continuing	Continuing
9999: *Congressional Adds*	0.000	9.655	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	9.655

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 for Program Executive Office Submarine (PEO SUB) programs and develops, tests, and prototypes new sonar arrays for PEO SUB programs. It delivers about thirty (30) new capabilities every other year to PEO SUB. Project 0223 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. This Project transitions technologies developed by Navy technology bases, the private sector, Office of Naval Research (ONR), Future Naval Capabilities (FNC), and DARPA. The 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.

Prototype hardware/software systems are developed to demonstrate technologically promising system concepts in laboratory and at-sea submarine environments. The focus of hardware systems will be the development and testing of advanced sensor technologies and large array configurations intended to support increased detection ranges and accuracy with increased reliability and lower life cycle costs.

This Project is funded under demonstration and validation, as it develops and integrates hardware for experimental tests related to specific platform applications. The focus of software systems will be sensor processing technology efforts conducted under the Advanced Processing Build (APB) program that develops and demonstrates

improvements to current and future sensor processing/combat control systems improving detection, localization, classification, decision support, counter-detection vulnerability, and other functions essential to mission success.

Technologies and/or capabilities developed under the APB 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 organization and 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.

Project 0223 is comprised of three major efforts: Advanced Processing Builds (APB), Flank Array Demonstration, and Advance 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:
SSN/SSGN Survivability Program (S3P) efforts previously funded under this project (through FY17) will move to Project 3391 in FY18. S3P addresses gaps in stealth and the survivability for current and future SSN/SSGN force.

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

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603561N *I Advanced Submarine System Development*

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
- 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

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603561N *I Advanced Submarine System Development*

Project 2096:
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 and demonstration will be conducted with the Fleet (i.e., CSF, UUVRON, etc.) enabling an agile environment to demonstrate and provide high velocity learning through at-sea demonstrations, which will provide the Fleet and acquisition communities relevant employment data to inform 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.

The major developmental efforts include:
- Payload Handling System (PHS) is used to enable capabilities for the integration of large deployable and retrievable undersea vehicles, payloads, and offboard systems with submarines. RDT&EN funding will be used to design, manufacture, and field an integrated system utilized with submarine large ocean interfaces to enable launch and recovery of systems such as the Navy's Snakehead Large Diameter Unmanned Underwater Vehicle (LDUUV), the Shallow Water Combat Submersible (SWCS), and the LBS-AUV(S) from submarines, a capability which does not currently exist.
- The 3" Sub Launched Unmanned Aerial System (SL-UAS) 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 payload with Blackwing for rapid deployment with an integrated solution into existing shipboard systems. This system will be demonstrated on a US Submarine, at a land based facility, or on another host platform by the end of FY20. Capability will transition to the Submarine Combat Control System Program Office (PMS 425).

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	85.834	100.565	94.556	-	94.556
Current President's Budget	85.496	106.365	100.955	-	100.955
Total Adjustments	-0.338	5.800	6.399	-	6.399
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	2.015	0.000			
• SBIR/STTR Transfer	-2.352	0.000			
• Program Adjustments	0.000	5.800	6.700	-	6.700
• Rate/Misc Adjustments	-0.001	0.000	-0.301	-	-0.301

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2016	FY 2017
Project: 9999: *Congressional Adds*		

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603561N *I Advanced Submarine System Development*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2016	FY 2017
Congressional Add: *Advanced submarine control*	9.655	0.000
Congressional Add Subtotals for Project: 9999	9.655	0.000
Congressional Add Totals for all Projects	9.655	0.000

Change Summary Explanation

Funding:
FY 2016: Decrease by $-2.352M for Small Business Innovative Research (SBIR) realignment, and increase by $+2.015M for Below Threshold Reprogramming (BTR) for Project 2033.

FY 2018: Net Increase by $+6.399M for development of a Kinetic Strike Payload for an Unmanned Aerial Vehicle ($+6.700M, Project 2096) and NWCF rate adjustments, and decreases Naval Innovative Science & Engineering (NISE)/Section 219.

Project 2033: In FY16, -$4.454M Congressional Reduction was applied for Stealth Programs.
In FY16, +$10M Congressional add was applied for Advanced Submarine Control. This add will develop, test and demonstrate numerous high risk advanced submarine control technologies associated with future submarine classes/design with advanced submarine payloads.
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).

Project 3391 (S3P):
- Project established in FY18. SSN/SSGN Survivability Program (S3P) previously funded under Project 2033 through FY17.

Project 2096:
- FY 2018 increase of $6.7M for the 3" Sub Launched Unmanned Aerial System (UAS).

Project 0223:
- FY 2016 to FY 2017 increase ($5.089M) is driven by the ramp-up of development of EW improvements within APB efforts and the development of a Sonar Tactical Decision Aid (STDA) common to submarine, surface and surveillance applications. EW is a top priority in the CNO's Design for Maintaining Maritime Superiority (Jan-16). Additionally, submarine, surface and surveillance programs each currently develop, field, and maintain similar, but unique, STDA products. The Common STDA development is intended to reduce future year development costs, by containing development efforts within one common system architecture and sharing of capability increases.
- FY 2017 to FY 2018 decrease ($1.468M) is due to a re-prioritization of requirements by the program sponsor.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / *Advanced Submarine System Development*	Project (Number/Name) 0223 / *Sub Combat System Improvement (ADV)*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0223: *Sub Combat System Improvement (ADV)*	448.761	37.207	42.296	40.828	-	40.828	51.417	50.693	51.754	52.796	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Submarine Combat System Improvement (Advanced) (Non-ACAT) Project supports Navy Submarine Acoustic Superiority and Technology Insertion initiatives by the application of advanced development and testing of sensor processing and tactical control systems improvements. This 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. Light-Weight Low Cost Conformal Array (LWLCCA) has completed development and transitioned to fielding. 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.

Technologies and/or capabilities developed here are shared to optimize re-use and cost effectiveness with surface and surveillance programs under the AxB program management methodology. ACB, ASB and APB may co-develop capabilities and modular architecture technologies to maximize commonality and cost effectiveness. Development efforts may be augmented by innovative concepts generated through the TANG Design Thinking process that includes Fleet operational end-users in capability design.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Advanced Processing Build (APB)	31.932	36.371	35.053	0.000	35.053
Articles:	-	-	-	-	-
Description: APB is a four Step process: Step 1 - algorithm/technology assessment by peer review panels of Subject Matter Experts (SME) to down-select technologies and assist developers with technical guidance. Step 2 - algorithm/technology testing with open and closed data sets to further down-select and refine capabilities prior to integration and testing.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 0223 / *Sub Combat System Improvement (ADV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Step 3 - land-based system-level testing stimulated by the Submarine Multi-Mission Team Trainer (SMMTT), in a realistic tactical environment. Step 4 - at-sea testing on an operational submarine. 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 will be 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. ***FY 2016 Accomplishments:*** Used the product of FY 2015 Return on Investment (ROI), Watch Section Task Analysis (WSTA) gaps and seams, and BAA evaluations along with direction from the Fleet/STRG/COMSUBFOR/N97 to establish content and continue the development of capabilities for APB-17. Initiated limited Electronic Warfare (EW) APB development program. Continued the development of capabilities for APB-17, completing Steps 1 and 2. Completed APB-15 Step 3 land-based and ROI testing, conducted Step 4 at-sea testing and transition to production. Conducted a TANG event at the Theater ASW (TASW) level to inform and generate innovative concepts for APB-19. ***FY 2017 Plans:*** - Continue the development of APB-17, integrate for testing, and initiate land-based laboratory string testing. Establish a Tactical Scenario Guide and conduct a WSTA gaps and seams test to inform system shortfalls in the context of the selected scenarios. - Conduct an Industry Day and BAA solicitation to drive competition for future APB innovative technologies. - 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 Pipeline capabilities. - Initiate development of a STDA common to submarine, surface and surveillance application.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 0223 / *Sub Combat System Improvement (ADV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Continue EW APB development program. In FY17 the EW APB program ramps-up the development of EW improvements within APB efforts and the development of a STDA common to submarine, surface and surveillance applications. EW develops ship vulnerability assessment tools to counter potential adversaries that are increasingly equipped with modern radars as well as non-Navy maritime traffic congesting littoral waters with high-end electronic signals. EW is a top priority in the CNO's Design for Maintaining Maritime Superiority (Jan-16). - Common STDA development is intended to reduce future year development costs, by containing development efforts within one common system architecture and sharing of capability increases. Life cycle STDA costs will also decrease as one baseline, rather than three, is documented, maintained and trained on. ***FY 2018 Base Plans:*** - Continue advanced concepts, data collection and analysis for EW APB. - Continue Common STDA development. - Conduct Step 3 land-based and Step 4 at-sea testing of APB-17. Hold MDA reviews and transition APB-17 to production. - Continue Step 1 and Step 2 development and testing of concepts, algorithms and technologies in response to Fleet requirements. - Conduct System Engineering review and Fleet-endorsed selection of technology candidates for APB-19. Begin integration of APB-19 capabilities. ***FY 2018 OCO Plans:*** N/A					
Title: Flank Array Demonstration	1.675	2.125	1.975	0.000	1.975
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Commenced 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. Conducted at-sea testing and data analysis of the LVA-2 array on USS Maryland in support of Acoustic Superiority goals. ***FY 2017 Plans:*** - 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.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 0223 / *Sub Combat System Improvement (ADV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Conduct critical at-sea testing events scheduled in FY 2017 for LVA-1 (installed on USS DALLAS), and FY 2017 and beyond for the newly fielded LVA-2 (installed/now operational 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 LFAs and 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 scheduled in FY 2017 for LVA-1, and FY 2017 and beyond for LVA-2 and the analysis of FY 2016/ FY 2017 at-sea test results. ***FY 2018 Base Plans:*** - 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 improving the forward and back-fit LVA production programs for Virginia Class Submarines, SSBN's, and Ohio Replacement Submarines. ***FY 2018 OCO Plans:*** N/A					
Title: Advanced Sensors	3.600	3.800	3.800	0.000	3.800
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Continued towed array embedded sensor and open architecture telemetry development. Fabricated embedded sensor test module and conducted tow test to evaluate in-hose performance of embedded sensors. Continued development of towed array vector sensors. Initiated development of next generation towed array using open architecture and embedded sensor technology ***FY 2017 Plans:*** - Continue embedded sensor and open architecture telemetry development. - Complete open architecture component development and design and fabricate towed array modules to demonstrate high bandwidth operation and dual sample rate capability. - Incorporate lessons learned from FY 2016 Lake Pend Oreille (LPO) testing into FY 2017 array design. Update telemetry system layout, architecture, and component designs. Conduct array environmental, calibration, and LPO testing.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Initiation of the plan to develop a High Speed Signal Path (HSSP) in support of the Bow Conformal Array (BCA)(new effort in FY17). The BCA is intended to improve sonar performance while reducing future submarine construction costs. ***FY 2018 Base Plans:*** - Incorporate lessons learned from FY 2017 LPO testing into FY 2018 array design. Update telemetry system layout, architecture, and component designs. Conduct array environmental, calibration, and LPO testing. - Continue development of the HSSP. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	37.207	42.296	40.828	0.000	40.828

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) embedded sensor prototype evaluation report.
- Deliver Fat Line Vector Sensor Towed Array (VSTA) Lake Pend Oreille test reports.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	C/CPFF	Adaptive Methods : VA	1.175	0.250	Mar 2016	0.250	Dec 2016	0.250	Dec 2017	-		0.250	0.000	1.925	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	1.765	0.020	May 2016	0.070	May 2017	0.070	Dec 2017	-		0.070	Continuing	Continuing	Continuing
Product Development	C/CPFF	General Dynamics : VA	20.097	1.934	Dec 2015	2.000	Dec 2016	2.500	Dec 2017	-		2.500	Continuing	Continuing	Continuing
Product Development	C/CPFF	GA Tech Research Institute : GA	3.016	0.060	Mar 2016	0.000		0.000		-		0.000	0.000	3.076	Continuing
Product Development	C/CPFF	In Depth Engineering : VA	4.700	0.665	Dec 2015	0.970	Nov 2016	0.500	Dec 2017	-		0.500	Continuing	Continuing	Continuing
Product Development	C/CPFF	JHU/APL : MD	86.155	7.200	Nov 2015	9.825	Nov 2016	9.400	Dec 2017	-		9.400	Continuing	Continuing	Continuing
Product Development	C/CPFF	Lockheed Martin : VA	55.358	8.120	Jan 2016	8.677	Nov 2016	8.535	Dec 2017	-		8.535	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	5.373	1.880	Dec 2015	1.025	Nov 2016	1.000	Dec 2017	-		1.000	Continuing	Continuing	Continuing
Product Development	WR	NSWC/Carderock : MD	25.885	1.414	Nov 2015	2.395	Oct 2016	2.585	Nov 2017	-		2.585	Continuing	Continuing	Continuing
Product Development	WR	NUWC/Newport : RI	86.348	7.897	Nov 2015	6.434	Nov 2016	6.480	Nov 2017	-		6.480	Continuing	Continuing	Continuing
Product Development	C/CPAF	NSMA : VA	11.144	0.750	Mar 2016	0.550	Feb 2017	0.650	Jan 2018	-		0.650	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	7.219	0.520	Dec 2015	0.784	Nov 2016	0.650	Dec 2017	-		0.650	Continuing	Continuing	Continuing
Product Development	C/CPFF	PSU/ARL : PA	9.080	0.400	Dec 2015	0.650	Nov 2016	0.650	Dec 2017	-		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	10.764	1.500	Nov 2015	1.500	Feb 2017	1.650	Dec 2017	-		1.650	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: FY 2018 Navy			Date: May 2017
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 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		0.000		0.000		-		0.000	0.000	4.595	Continuing
Product Development	MIPR	U.S. Hanscom AFB/ MIT Lincoln Labs : MA	15.409	1.880	Nov 2015	2.080	Dec 2016	2.150	Dec 2017	-		2.150	Continuing	Continuing	Continuing
Product Development	C/CPFF	UT/ARL : TX	27.872	0.937	Dec 2015	0.775	Nov 2016	0.700	Dec 2017	-		0.700	Continuing	Continuing	Continuing
Product Development	C/CPFF	VAR : VAR*	22.001	0.722	Dec 2015	3.253	Dec 2016	2.000	Dec 2017	-		2.000	Continuing	Continuing	Continuing
		Subtotal	431.126	36.149		41.238		39.770		-		39.770	-	-	-

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 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 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	0.000	1.000	Dec 2015	1.000	May 2017	1.000	Dec 2017	-		1.000	Continuing	Continuing	Continuing
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	0.679	0.058	Oct 2015	0.058	Dec 2016	0.058	Oct 2017	-		0.058	Continuing	Continuing	Continuing
		Subtotal	17.635	1.058		1.058		1.058		-		1.058	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	448.761	37.207		42.296		40.828		-		40.828	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
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	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
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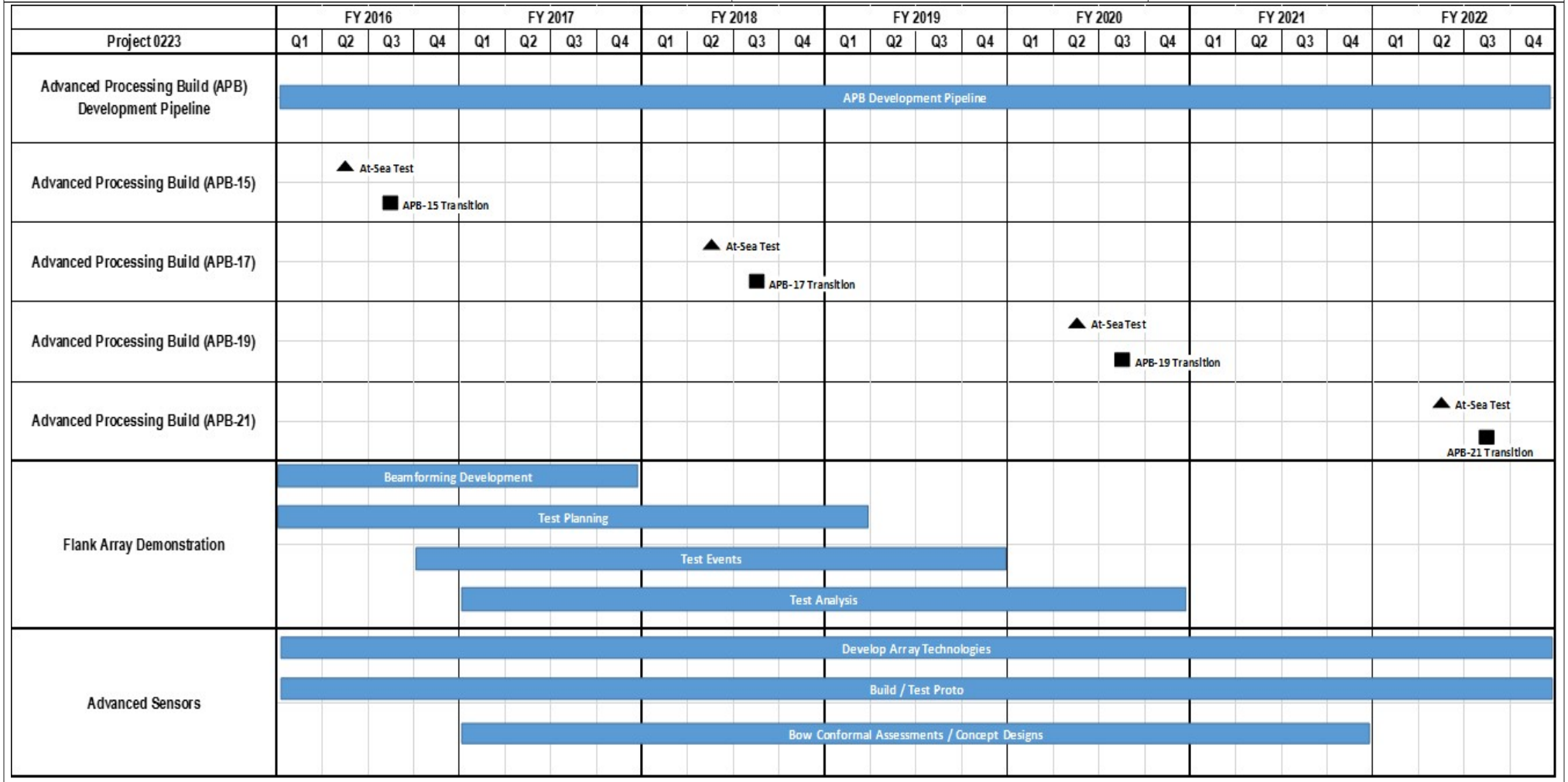

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
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Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 0223				
Advanced Processing Build (APB): APB Development (continued)	1	2016	4	2022
Advanced Processing Build (APB): APB-15: APB-15 At-Sea Test	2	2016	2	2016
Advanced Processing Build (APB): APB-15: Transition APB-15 to PEO SUB Production Programs	3	2016	3	2016
Advanced Processing Build (APB): APB-17: APB-17 At-Sea Test	2	2018	2	2018
Advanced Processing Build (APB): APB-17: Transition APB-17 to PEO SUB Production Programs	3	2018	3	2018
Advanced Processing Build (APB): APB-19: APB-19 At-Sea Test	2	2020	2	2020
Advanced Processing Build (APB): APB-19: Transition APB-19 to PEO SUB Production Programs	3	2020	3	2020
Advanced Processing Build (APB): APB-21: APB-21 At-Sea Test	2	2022	2	2022
Advanced Processing Build (APB): APB-21: Transition APB-21 to PEO SUB Production Programs	3	2022	3	2022
Flank Array: Beamforming Development	1	2016	4	2017
Flank Array: Flank Array Test Planning	1	2016	1	2019
Flank Array: Flank Array Test Conduct	4	2016	4	2019
Flank Array: Flank Array Test Analysis	1	2017	4	2020
Advanced Sensors: Develop Array Technologies (continued)	1	2016	4	2022
Advanced Sensors: Build & Test Prototype Arrays (continued)	1	2016	4	2022
Advanced Sensors: Bow Conformal Assessments / Concept Designs	1	2017	4	2021

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COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2033: *Adv Submarine Systems Development*	444.547	38.634	55.677	35.795	-	35.795	34.828	35.419	36.164	36.880	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 risk and costs 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 Agreements (PA) with the United Kingdom, Canada, Australia and other international partners. The technology efforts in ASSD develop future technologies able to be integrated into the Virginia class, Columbia class and in-service submarine programs.

Several programmatic 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. 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) will move 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 2016 to FY 2017 was programmed by CNO for design, procurement, and installation of an advanced submarine hull treatment demonstration as part of the Acoustic Superiority demonstrator, South Dakota (SSN 790) Insertion Program (SDIP). Additional increases to support a CNO Speed to Fleet initiative and investment to establish rapid prototyping development funding for advanced submarine payloads and time-critical technology efforts were also provided.

Project 2033 is comprised of three budget categories: Strategic Capability R&D Infrastructure, Long Range R&D Investment, Rapid Technology Prototyping. 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

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submarine baselines at contract award. Rapid technology prototyping are technology projects focused on delivering a technology capability within a 18-30 month window from program start to submarine at-sea demonstration.

Major developmental efforts include:

- Large Scale Vehicle (LSV)
- Intermediate Scale Measurement System (ISMS)
- Advanced Submarine Control
- Advanced Material Propeller (AMP) Technology
- Innovation Technology Transition (SBIRs/STTRs transition)
- Next Generation Attack Submarine Technologies
- Next Generation (NG) Thrust (Future Propulsor/Shaft Technologies)
- Submarine Signature Management/Acoustic Superiority
- Advanced Hull Coatings
- Next Generation Towed Array Reliability
- Support of ONR Future Naval Capability (FNC) new starts transitioning to submarine platforms
- Hydraulic Elimination through Electrification
- Common Unmanned Aerial Vehicle (UAS) Communications
- 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)/Submarine Unmanned Aerial System (UAS)
- Submarine Payload Integration
- EW/ISR Unmanned Underwater Vehicle (UUV) Payload
- Submarine Launched Decoy

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Strategic Capability R&D Infrastructure	12.410	17.217	18.856	0.000	18.856
Articles:	-	-	-	-	-
Description: 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 of Record (plus numerous other smaller programs) and future submarine technology development. 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					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
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 2016 Accomplishments:*** Conducted system upgrades on ISMS. Conducted LSV2 core ship systems maintenance, maintain crew qualifications, ensure compliance with all LSVSAFE and general regulations, maintain and operate acoustic data systems and all required shore support systems. Continued critical COLUMBIA propulsor trials and conducted propulsor testing. Initiated recapitalization of the LSV2 advance submarine control system. Completed plan for long-term recapitalization of LSV2, including electric drive system replacement conceptual down-selection. ***FY 2017 Plans:*** Continue ongoing system upgrades and replacements on ISMS. 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. Continue critical COLUMBIA propulsor trials. Support ship and system alterations to support COLUMBIA signature and propulsor trials, including replacement of LSV acoustic array and underwater tracking systems. Complete recapitalization of the LSV2 advanced submarine control system. Begin design for LSV2 drive system replacement. ***FY 2018 Base Plans:*** 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. Test and validate new LSV range acoustic arrays and tracking systems, continue critical COLUMBIA propulsor trials, support advanced array hardware and systems maintenance. Complete replacement of LSV acoustic array and underwater tracking system. Support ship and system alterations to safely support COLUMBIA signature and propulsor trials. ***FY 2018 OCO Plans:*** N/A					
Title: Long Range R&D	18.412	27.592	13.522	0.000	13.522
Articles:	-	-	-	-	-

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 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 submarine alternative propulsion, propeller designs, 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 that are providing near-term capability and cost reduction for in-service and future submarine classes.					
FY 2016 Accomplishments: Completed data collection of the Advanced CO2 Removal Unit (ACRU) shipboard test cube on aboard SSBN platform (technology baselined for COLUMBIA class insertion). Completed development of Ionic Current Monitoring System (ICMS) technology and started planning a TEMPALT demonstration on a VIRGINIA Class hull. Installed the Advanced Active Shaft Grounding System (AASGS) Electronic Grounding Unit (EGU) TEMPALT on a VIRGINIA Class hull for demonstration at-sea. Completed pierside test planning and EM trial planning for the EGU TEMPALT. Completed development of the AASGS Shaft Current Sensor (SCS) and the Contact Technology (CT) technologies and start planning TEMPALTs on a VIRGINIA Class hull. Initiated performance testing of Sprayable Acoustics Damping System (SADS) Improved Damping Tile System (IDTS) material. Completed the design and fabrication and performed in-water testing of the Advanced Submarine Control (ASC) pump jet technology for the VIRGINIA Class baseline. Completed the fabrication and certification testing of the Advanced Material Propeller (AMP) Generation 2 full scale metallic hub and shipped equipment for extended fatigue testing as part of US-AUS Project Arrangement. Continued to leverage products between Small Business and IR&D efforts. Commenced risk reduction efforts associated with demonstration of high TRL advanced coating system on a VIRGINIA class platform. Defined requirements and finalized program to transition ONR Future Naval Capability (FNC) advanced coating concepts to future undersea platforms. Conducted advanced coating laboratory performance tests for US and UK materials as part of international cooperative project. Initiated submarine advanced signature management programs designed to enhance submarine acoustic and non-acoustic stealth					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
(classified details). Completed at-sea demonstration of the Tension Belt Drogue (TBDD) prototype on 688-class submarine while continuing land-based testing on the Towed Array OA-9070B Dual Belted Diverter (DBD) and Tensioner. Continued developing the Towed Array design and operational loading and distribution predicting tool FNC and conducted land-based and in-water testing with a full-scale instrumented validation towed array to validate the tool. Transitioned towed modelling and handler efforts to the Submarine Acoustic Systems Program Office (PMS 401). ***FY 2017 Plans:*** Install the ICMS TEMPALT on a VIRGINIA Class hull for demonstration at-sea and complete pier-side test and EM trial planning for the TEMPALT. Perform at-sea testing of the AASGS EGU TEMPALT at-sea. Install the AASGS SCS and CT AASGS TEMPALTs on VIRGINIA class platform for demonstration at-sea. Develop CONOPs and performance specifications for the ASC pump jet technology. Continue developing and testing submarine aft and forward ASC pump jet technology and initiate shipboard integration design efforts for the VA Class baseline with PMS450. Manufacture Generation 3 full-scale AMP composite blades and metallic hub. Perform hub and blade assembly testing. Continue to leverage products between Small Business and Independent Research and Development (IR&D) efforts. Assess and study future technologies for future submarine classes and perform studies for cost and platform performance. Identify enabling technologies and submarine concept design integration characteristics. Initiate technology development efforts on critical, long-lead technologies. Define and evaluate new/alternative Next Generation Thrust (NGT) technologies, design concepts, alternative materials and evaluate system configuration arrangements. Perform laboratory stress magnetization and electric model experiments on joint US/UK models. Commence detailed planning associated with large-scale testing to perform underwater electric and magnetic signature testing utilizing UK asset(s) at US range facility. Continue development of submarine advanced signature management efforts (classified details). Conduct advanced coating laboratory performance tests for US and UK advanced hull materials. Initiate industrialization efforts for the ONR FNC advanced treatments. Commence fabrication and testing of treatments and development of an Operational Alternation (OPALT) package. Leverage lessons learns from Virginia class advanced hull treatment demonstration to initiate qualification testing associated with transition of ONR FNC treatment concepts for future platforms. Identify full-scale demonstration opportunities and initiate development of required OPALT data packages. ***FY 2018 Base Plans:***					

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Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Perform at-sea testing for an EM trial of ICMS TEMPALT. Perform pier-side testing and EM trial of AASGS SCS and CT TEMPALTs. Deliver full-scale Generation 3 AMP composite blades and metallic hub assembly to the Royal Australian Navy (AUS) for demonstration at-sea on a Collins Class submarine. Continue to leverage products between Small Business and Independent Research and Development (IR&D) efforts. Continue NGT design studies and plan small and/or large scale testing of technologies. Develop a plan to integrate and assess impact of proposed NGT technology into future submarine design concepts. Further develop high TRL and low TRL treatment concepts with the UK and support technical exchanges. Continue industrialization and material assessment to transition advanced coatings technologies from ONR FNC effort. Continue development of submarine advanced signature management efforts (classified details). Conduct patch tests of advanced treatments to platforms. SSN/SSGN Survivability Program (S3P) efforts previously funded under this project have moved to Project 3391 under this Program Element. ***FY 2018 OCO Plans:*** N/A					
Title: Rapid Prototyping ***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 systems to the acquisition community. ***FY 2016 Accomplishments:*** - Transitioned the AWESUM/Submarine UAS from the study/prototype system that was demonstrated in SEP 2015 in a Joint Concept Test Demonstration to a fully tactical system. Installed AWESUM/Submarine UAS tactical system on US submarine for a full deployment. Transitioned program to the Submarine Combat Control System Program Office (PMS 425). - Completed the Lithium Ion Battery S2F project with certification testing. Established a follow-on project for the rapid prototyping of the design for demonstration and testing on a US submarine in FY18. Main elements of the project included construction of a Lithium-safe SAFECAP design and TEMPALT package for integration into a submarine. - Commenced development of the next generation Electronic Warfare/Intelligence, Surveillance and Reconnaissance (EW/ISR) payload for the FMAUV/Littoral Battle Space (LBS) UUV and associated submarine	7.812 -	10.868 -	3.417 -	0.000 -	3.417 -

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
support and integration. Matured the Submarine Launched Decoy (SLD) to a relevant configuration for at sea testing. Developed a TEMPALT and manufactured test assets for testing in FY17 and transitioned to PMS435. - Initiated the Clandestined Delivered Mine (CDM) rapid prototyping project (FY16 BTR - of $2.0M). Initiated efforts for submarine integration of multiple advanced UAS payloads with a common communication architecture. ***FY 2017 Plans:*** - Continue development of the Lithium Ion SAFECAP design and prepare TEMPALT packages for full-scale mission demonstration. - Complete development of the submarine Launched Decoy and conduct at-sea testing and analysis. Transition project to the Submarine Sensors Program Office (PMS435). - Complete development of the next generation EW/ISR payload for the FMAUV/LBS vehicle and conduct at-sea test demonstration. Transition payload to the Battlespace Awareness and Information's Operations Program Office (PMW 120). - Initiate rapid prototyping project to develop a common, communication architecture for employment of UAS from submarines (Blackwing and Experimental Fuel (XFC) UAVs). Project will conduct a demonstration of this architecture in a submarine mast by the end of FY18. - Continue CDM rapid prototyping project. Tasks include vehicle design and development efforts to support a late FY17 procurement contract for the vehicle system and initiation of a full Weapons System Explosive Safety Review Board (WSESRB) process (transition office is TBD). To continue CDM efforts, FY18 expenditures will be funded FY17 carryover funding. ***FY 2018 Base Plans:*** - Conduct at-sea testing of the final submarine SAFECAP hardware and TEMPALT package. Transition the design into the LBS program of record in the Battlespace Awareness and Information's Operations Program Office (PMW 120). - 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) and Communications (PMW770) program offices. Continue integration and testing of innovative payload concepts into off-hull platforms. Initiate development of an advanced long-range fiber deployable buoy for submarine safety and ISR. Initiate TEMPALT design and operational test plan development.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Continue CDM rapid prototyping project and conduct initial at-sea assessments. Continue to conduct safety and certification analysis and reviews to ensure Weapons System Explosive Safety Review Board (WSESRB), Fuse and Initiation System Technical Review Panel (FISTRP), and the Software Safety Technical Review Panel (SSSTRP) certification. Conduct study TEMPALT shock certification, implosion certification, information assurance, hydrodynamic release analysis and other TEMPALT requirements. Initiate technical authority review and approval process for submarine TEMPALT. FY18 CDM efforts to include vehicle procurement, integration testing and initial in-water testing will be financed with FY 17 carryover. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	38.634	55.677	35.795	0.000	35.795

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

F2033: 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

To enable transition of a minimum of three technology challenge solutions supporting emergent warfighter needs.
- Sustain critical one of a kind national Research and Development (R&D) hydroacoustic infrastructure enabling the design and assessment of VIRGINIA Class, OHIO Replacement, and future submarine class designs.
- Deliver 2-3 Rapid Prototype projects annually to evaluating future submarine technology/payload concepts.
- Tactical deployment of AWESUM/Submarine UAS system on a US submarine.
- Assess as-built VIRGINIA and SSGN submarines for design drivers/design tools and model validation to define R&D needs for future submarine classes.
- Test innovative Towed Array Handler concept focused on improving system reliability and fleet operational availability.
- Develop future coatings to enable continued acoustic superiority of VA Class design.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

- Successfully construct and deliver full-scale advanced material propeller for at-sea testing.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	WR	NSWC PHILLY : Philly, PA	0.000	0.165	Dec 2015	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Product Development	MIPR	CNA : Alex, VA	1.060	0.430	Feb 2016	0.200	Feb 2017	0.204	Feb 2018	-		0.204	0.000	1.894	-
Product Development	SS/CPFF	Lockheed Martin : Manassas, VA	1.500	0.217	Dec 2015	0.000		0.000		-		0.000	0.000	1.717	-
Product Development	WR	NRL : Washington, DC	1.423	0.895	Feb 2016	0.000		0.000		-		0.000	0.000	2.318	-
Product Development	SS/CPFF	Rolls Royce, Marine North America : New Bedford, MA	2.580	0.500	Mar 2016	0.000		0.000		-		0.000	0.000	3.080	-
Product Development	SS/CPFF	SupShips : Groton, CT	2.434	0.524	Feb 2016	0.000		0.000		-		0.000	0.000	2.958	-
Product Development	WR	Applied Physical Sciences : Groton, CT	0.400	0.086	Dec 2015	0.000		0.000		-		0.000	0.000	0.486	-
Product Development	SS/CPFF	HII : Newport News, VA	8.580	0.000	Apr 2016	4.730	Apr 2017	4.750	Apr 2018	-		4.750	Continuing	Continuing	Continuing
Product Development	WR	NSWC : Dahlgren, VA	5.271	0.060	Dec 2015	0.000		0.000		-		0.000	0.000	5.331	5.241
Product Development	SS/CPFF	EB : Groton, CT	58.126	3.525	Apr 2016	17.104	Apr 2017	2.901	Apr 2018	-		2.901	Continuing	Continuing	Continuing
Product Development	SS/CPFF	Raytheon : Portsmouth, RI	16.034	0.200	Nov 2015	0.000		0.000		-		0.000	0.000	16.234	16.340
Product Development	WR	NSWC : Carderock, MD	85.469	3.744	Apr 2016	5.705	Apr 2017	5.750	Apr 2018	-		5.750	Continuing	Continuing	Continuing
Product Development	SS/CPFF	ARL/PSU : State College, PA	7.758	0.670	Apr 2016	0.575	Apr 2017	0.580	Apr 2018	-		0.580	Continuing	Continuing	Continuing
Product Development	SS/CPFF	UT/ARL : Austin, TX	6.300	1.076	Dec 2015	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Product Development	SS/CPFF	JHU/APL : Laurel, MD	18.922	3.075	May 2016	1.200	Apr 2017	1.224	Apr 2018	-		1.224	Continuing	Continuing	Continuing
Product Development	Various	Various : Various	35.921	0.000		0.289	Apr 2017	0.290	Apr 2018	-		0.290	Continuing	Continuing	Continuing
Product Development	WR	NUWC : Newport, RI	71.219	4.914	Mar 2016	1.820	Mar 2017	1.825	Mar 2018	-		1.825	Continuing	Continuing	Continuing
Product Development	WR	ONR : Arlington, VA	8.641	1.583	Dec 2015	0.000		0.000		-		0.000	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	SS/CPFF	Progeny : Manassas VA	0.620	0.075	Dec 2015	0.000		0.000		-		0.000	0.000	0.695	-
		Subtotal	332.258	21.739		31.623		17.524		-		17.524	-	-	-

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.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Engineering Support	SS/CPFF	Various : Various	12.304	1.313	Jun 2016	1.339	Jun 2017	1.340	Jun 2018	-		1.340	Continuing	Continuing	Continuing
Government Engineering Support	WR	Various : Various	6.513	0.350	Mar 2016	0.350	Mar 2017	0.357	Mar 2018	-		0.357	Continuing	Continuing	Continuing
Travel	WR	NAVSEA HQ : Not Specified	0.859	0.144	Apr 2016	0.100	Mar 2017	0.102	Mar 2018	-		0.102	Continuing	Continuing	Continuing
Acquisition Workforce	Various	Not Specified : Not Specified	0.293	0.000		0.000		0.000		-		0.000	0.000	0.293	0.293
		Subtotal	19.969	1.807		1.789		1.799		-		1.799	-	-	-

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 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	SS/CPFF	EB : Groton, CT	11.998	1.700	Mar 2016	5.800	May 2017	5.810	May 2018	-		5.810	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
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Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	SS/CPFF	Raytheon : Portsmouth, VA	9.104	0.000		0.000		0.000		-		0.000	0.000	9.104	9.104
Developmental Test & Evaluation	Various	Various : Various	7.387	0.000		0.670	Apr 2017	0.675	Apr 2018	-		0.675	0.000	8.732	6.372
Developmental Test & Evaluation	WR	NUWC : Newport, RI	20.883	2.000	Apr 2016	7.050	Apr 2017	1.255	Apr 2018	-		1.255	Continuing	Continuing	Continuing
Developmental Test & Evaluation	WR	NSWC : Carderock, MD	34.629	9.263	Apr 2016	6.745	Apr 2017	6.732	Apr 2018	-		6.732	Continuing	Continuing	Continuing
Developmental Test & Evaluation	SS/CPFF	HII : Newport News, VA	5.794	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Developmental Test & Evaluation	SS/CPFF	JHU/ARL : Laurel, MD	1.805	2.000	May 2016	2.000	Apr 2017	2.000	Apr 2018	-		2.000	0.000	7.805	0.305
Developmental Test & Evaluation	SS/CPFF	ARL/PSU : State College, PA	0.720	0.125	Dec 2015	0.000		0.000		-		0.000	0.000	0.845	0.720
		Subtotal	92.320	15.088		22.265		16.472		-		16.472	-	-	-

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 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	444.547	38.634		55.677		35.795		-		35.795	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

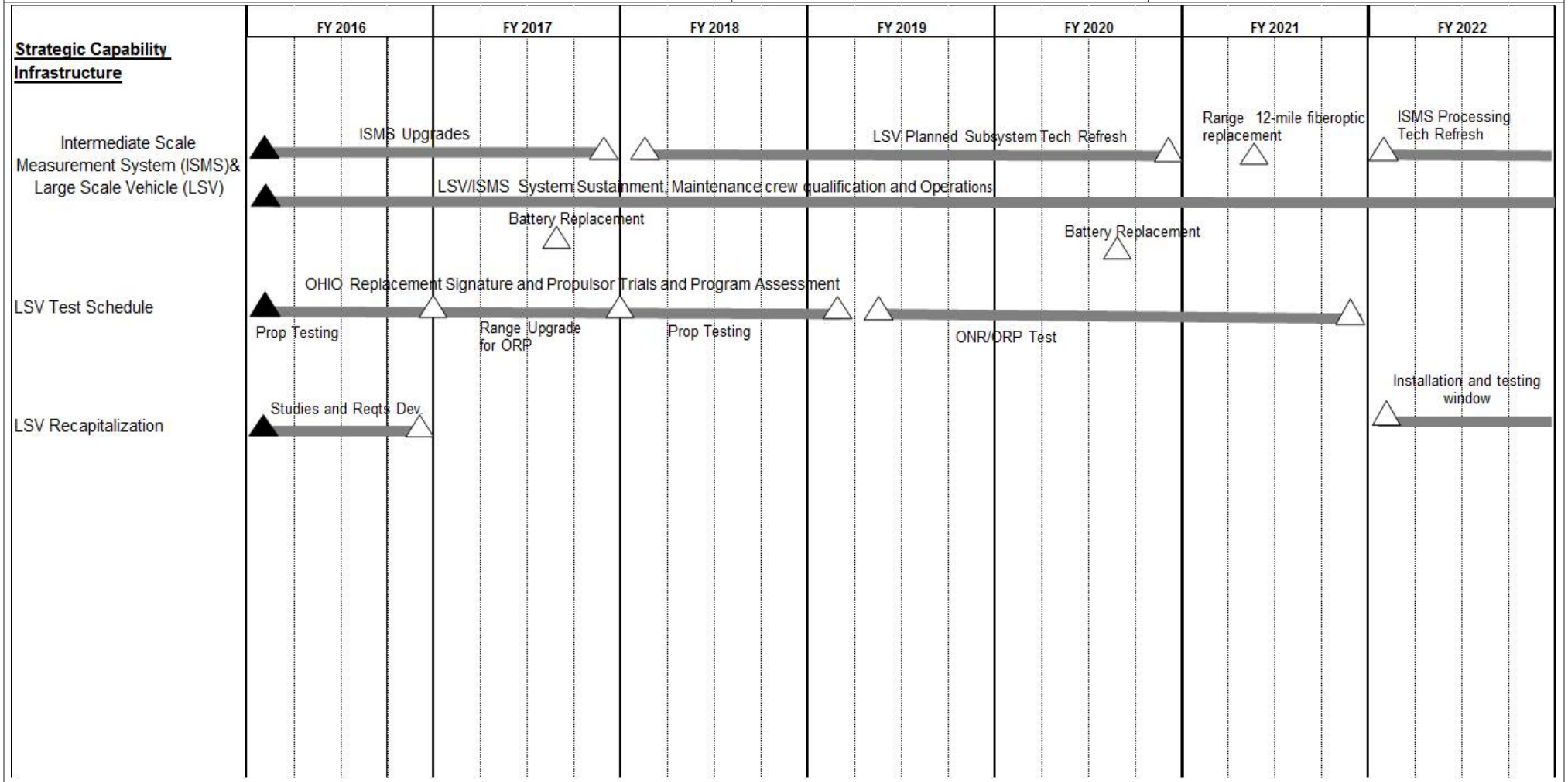

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

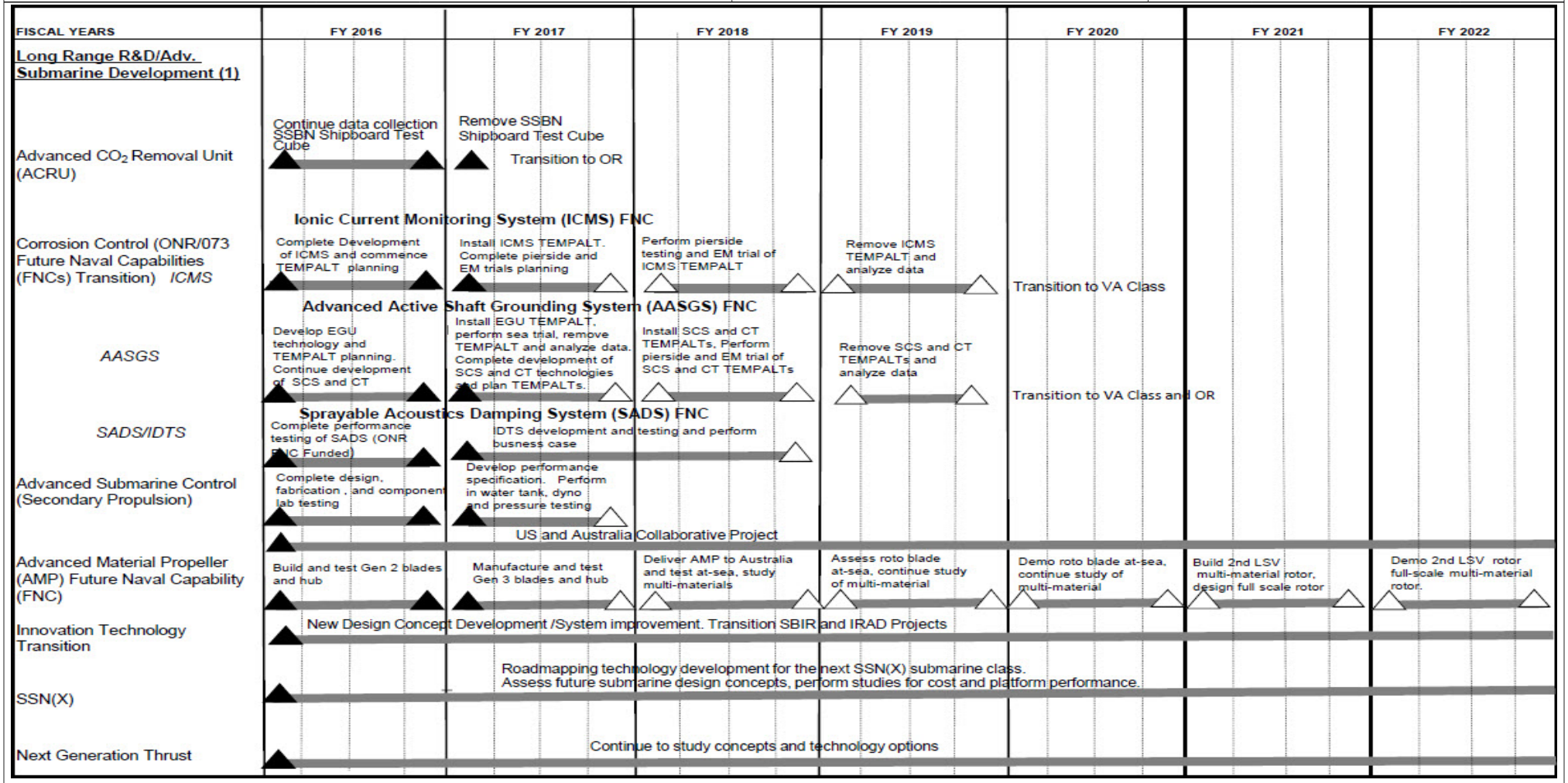

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
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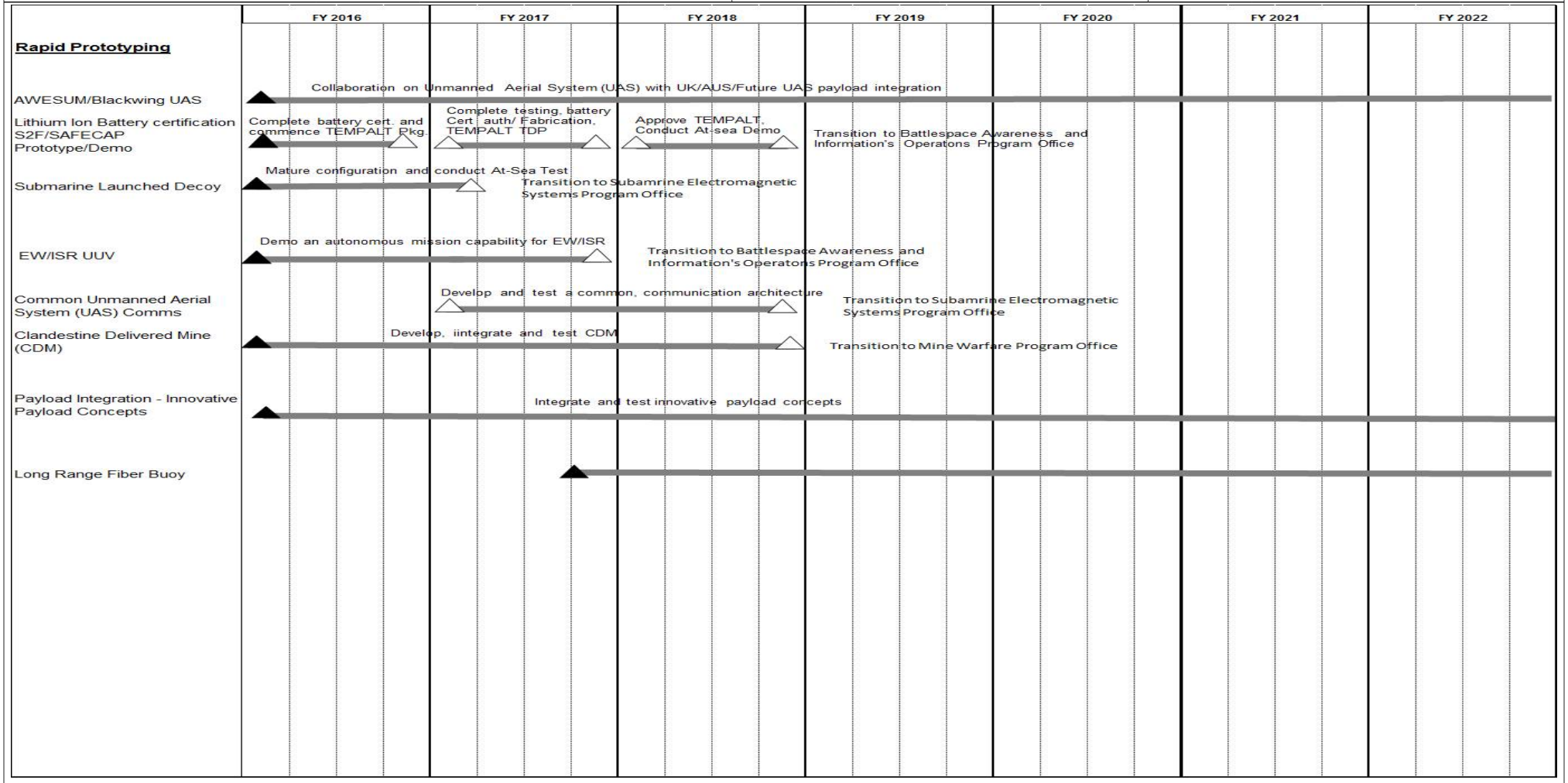

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
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Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2033				
Strategic Capability Infrastructure: ISMS/LSV - ISMS Upgrades	1	2016	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	2016	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 - Prop Testing	1	2016	4	2016
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 - Studies and Requirements Dev.	1	2016	4	2016
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) - Continue data collection SSBN Shipboard Test Cube	1	2016	4	2016
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 - Complete Development of ICMS and commence TEMPALT Planning	1	2016	4	2016

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
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	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
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 - Install EGU TEMPALT and complete planning. Commence TEMALT planning for SCS and CT Technologies	1	2016	4	2016
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
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: Corrosion Control - SADS - Complete performance testing (ONR funded)	1	2016	4	2016
Long Range R&D/Advanced Submarine Development: Advanced Submarine Control (ASC) - Complete design, fabrication & certification testing	1	2016	4	2016
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	2016	4	2022
Long Range R&D/Advanced Submarine Development: Advanced Material Propeller (AMP) - Build and test Gen 2 blades and hub	1	2016	4	2016
Long Range R&D/Advanced Submarine Development: Advanced Material Propeller - Manufacture and test Gen 3 blades and hub	1	2017	4	2017

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
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	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
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	2016	4	2022
Long Range R&D/Advanced Submarine Development: SSN(X) - Roadmapping technology developnent for the next submarine class	1	2016	4	2022
Long Range R&D/Advanced Submarine Development: Next Generation Thrust (NGT)	1	2016	4	2022
Long Range R&D/Advanced Submarine Development: Electromagnetic Signatures Project Arrangement with UK & Advanced Signature Management FNC	1	2016	4	2022
Long Range R&D/Advanced Submarine Development: Advanced Hull Coatings - Joint US/UK Coatings Development and Modeling	1	2016	4	2017
Long Range R&D/Advanced Submarine Development: Advanced Hull Coatings - Transition ONR Future Naval Capability (FNC) Hull Coatings	1	2016	4	2022
Long Range R&D/Advanced Submarine Development: Advanced Hull Coatings - Develp OPALT Treatment pkg and begin Long Lead Procurement	2	2016	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

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Long Range R&D/Advanced Submarine Development: Advanced Hull Coatings - Data Analysis	1	2020	4	2022
Long Range R&D/Advanced Submarine Development: Next Generation Towed Array Handler (NGTAH) and In-Service Reliability - Complete at-sea demo	1	2016	1	2016
Long Range R&D/Advanced Submarine Development: Next Generation Towed Array Handler and In-Service Reliability - Perform Landbased test on the belt diverter and Tensioner. Transition to PMS401	2	2016	4	2016
Long Range R&D/Advanced Submarine Development: Towed Array Reliability Improvement FNC - Conduct landbased and in-water testing	1	2016	4	2016
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	2016	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	2016	4	2019
Long Range R&D/Advanced Submarine Development: SSN/SSGN (S3P) - Address gaps in stealth and survivability for SSN and SSGNs	1	2016	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	2016	4	2017
Long Range R&D/Advanced Submarine Development: Operational Survivability - Assessment of SSN/SSGN acoustic health as requested by the SOG	1	2016	4	2017
Long Range R&D/Advanced Submarine Development: Non-Acoustic Assessment - Assessment of SSN/SSGN non-acoustic health as requested by the SOG	1	2016	4	2017
Long Range R&D/Advanced Submarine Development: SAS Sea Testing - Sub vs. Sub Sea Testing	1	2016	4	2017

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
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	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Long Range R&D/Advanced Submarine Development: Mast Sea Testing - RCS Measurement and Operational Tesing	1	2016	4	2016
Long Range R&D/Advanced Submarine Development: NOMAD - Model, Test, and Analysis	1	2016	4	2016
Long Range R&D/Advanced Submarine Development: Communication - Model, Test and Analysis	1	2016	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 (1-2 per year)	1	2016	4	2016
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 - Sea Test Tactical TEMPALT	1	2016	4	2016
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 - At-seaTest/Validate Models	1	2016	4	2016
Long Range R&D/Advanced Submarine Development: Countermeasure #1 Development - Update Algorithms	1	2017	4	2017
Rapid Prototyping: AWESUM JCTD - Collaboration on Unmanned Aerial System (UAS) with UK/AUS/Future payload integration	1	2016	4	2022
Rapid Prototyping: Lithium Ion Battery Certification - Complete battery certification and TEMPALT Technical Data Pkg (TDP)	1	2016	4	2016
Rapid Prototyping: Lithium Ion Battery Certification -Complete testing, certification approval, fabrication, TEMPALT TDP	1	2017	4	2017

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
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	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Rapid Prototyping: Lithium Ion Battery Certification - Approve TEMPALT, conduct at-sea demo. Transition to Battlespace Awareness and Information Operations Program Office	1	2018	4	2018
Rapid Prototyping: Submarine Launch Decoy - Mature configuration and conduct At-Sea Test	1	2016	4	2017
Rapid Prototyping: EW/ISR UUV - Demo an autonomous mission capability for EW/ISR	1	2016	4	2017
Rapid Prototyping: Common Unmanned Aerial System (UAS) Coms	1	2017	4	2018
Rapid Prototyping: Clanedestine Delivered Mine (CDM) - Develop, integrate and test CDM	1	2016	4	2018
Rapid Prototyping: Payload Integration - Innovative Payload Concepts	1	2016	4	2022

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
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COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2096: *Payload Delivery Development*	0.000	0.000	8.392	15.738	-	15.738	19.889	26.622	9.391	8.749	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 and demonstration will be conducted with the Fleet (i.e., CSF, UUVRON, etc.) enabling an agile environment to demonstrate and provide high velocity learning through at-sea demonstrations, which will provide the Fleet and acquisition communities relevant employment data to inform 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.

Payload Handling System (PHS)
PHS is used to enable capabilities for the integration of large deployable and retrievable undersea vehicles, payloads, and offboard systems with submarines. RDT&EN funding will be used to design, manufacture, and field an integrated system utilized with submarine large ocean interfaces to enable launch and recovery of systems such as the Navy's Snakehead Large Diameter Unmanned Underwater Vehicle (LDUUV), the Shallow Water Combat Submersible (SWCS), and the LBS-AUV(S) from submarines, a capability which does not currently exist. This capability will allow the Submarine Force the flexibility to launch and recover Snakehead, SWCS, LBS-AUV(S), and other advanced systems of various configurations in support of critical Undersea Warfare (USW) missions, providing battle space awareness and extending war-fighting reach. This capability has been identified as a key enabler for the following critical USW mission areas: Intelligence, Surveillance, and Reconnaissance (ISR), Anti-Submarine Warfare (ASW), Anti-Surface Warfare (ASUW), Naval Special Warfare (NSW), Mine Warfare, Seabed Warfare, Counter - Autonomous Underwater Vehicle (AUV) Warfare, Electromagnetic Maneuver Warfare (EMMW), Deception, and Non-Lethal Sea Control. This capability is paramount to countering evolving threats from emerging world powers and maintaining dominance in the undersea domain.

Program growth from FY17 to FY18 is required in order to provide necessary design and engineering team support for the completion of preliminary design review (PDR) for the PHS and transition to critical design in FY18. The nominal level of preliminary design tasking planned for FY17 will be increased significantly in FY18 to support development of design products which will comprise the technical package for PDR and the basis for detailed design to support critical design review (CDR). Additional FY18 growth efforts will include development of interface control between PHS, submarine platforms, and hosted offboard systems, and collaborative engineering efforts required for integration into both current and future submarine designs. Funding below requested levels would result in delay of PHS delivery and risk to payload integration into current and future submarines, severely limiting Fleet capability to launch and recover undersea vehicles, payloads, and offboard systems in support of critical undersea warfare (USW) missions. Additionally, all far forward USW mission tasking will continue to be limited to only manned platforms and prevent the Submarine Force from exploiting the potential of offboard systems for conducting otherwise impossible tasks.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2096 / *Payload Delivery Development*

3" Sub Launched Unmanned Aerial System (SL-UAS)
SL-UAS 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 payload with Blackwing for rapid deployment with an integrated solution into existing shipboard systems. This system will be demonstrated on a US Submarine, at a land based facility, or on another host platform by the end of FY20. Capability will transition to the Submarine Combat Control System Program Office (PMS 425).

The following key activities support a critical capability for Undersea Warfare (USW) missions by providing close-in defense for the Submarine Force against adversary systems:

1. Engineering and integration of existing/proven technology and payloads required to provide the capabilities to maintain dominance in the undersea domain.
2. Communication modifications for transition of new capability into both current and future submarine designs.
3. Testing and demonstrations necessary to prove out the capability and Concept of Operations (CONOP).
4. Development of a high density storage system to safely stow proposed equipment types onboard submarines.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Payload Handling System (PHS)	0.000	8.392	9.038	0.000	9.038
Articles:	-	-	-	-	-
FY 2016 Accomplishments: N/A					
FY 2017 Plans: Conduct non-recurring engineering to support preliminary design of PHS for integration of government and industry payloads and offboard systems into the Submarine Force: Start development of the following for PDR: -System Arrangement -Structural Analysis -Hydrodynamic Load Case Modeling/Analysis -Shock Modeling/Analysis -Interface Control Documentation					
FY 2018 Base Plans: Continue non-recurring engineering to support completion of preliminary design review (PDR). Commence detailed/critical design of PHS to support integration of government and industry payloads and offboard systems into the Submarine Force: Start/Continue/Complete development of the following for PDR:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2096 / *Payload Delivery Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
-System Arrangement -Structural Analysis -Hydrodynamic Load Case Modeling/Analysis -Shock Modeling and Analysis -Interface Control Documentation -System Schematic and Diagram -Payload Handling Element Material Friction Test -Payload Handling Element Design -Hydraulic System Design -Electrical and Control System Design -Complete PDR Start the following for CDR: -Payload Handling Element Detailed Design -Hydraulic System Detailed Design -Electrical and Control System Detailed Design -System Schematic and Diagram update based on detailed design -System Arrangement based on detailed design -Detailed Structural Analysis -Detailed Hydrodynamic Load Case Modeling/Analysis -Detailed Shock Modeling/Analysis -Interface Control Documentation -Long Lead Material Identification -Manufacturing Cost Estimate Development -Operating Procedure Development -Hazard Assessment Development -Failure Modes and Effects Analysis ***FY 2018 OCO Plans:*** N/A					
Title: 3" Sub Launched Unmanned Aerial System (SL-UAS)	0.000	0.000	6.700	0.000	6.700
Articles:	-	-	-	-	-
FY 2016 Accomplishments:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** Initiate rapid prototyping and system engineering efforts required for integration of a payload with the Blackwing design (including review and modification of system requirements, communications, interface and drawings for payload equipment, and system and subsystem detailed design). Start/Complete the following efforts: - Define system requirements of UAV, cannister, and payload - UAV reliability/production effort - Further development of MCM/MMM and common data link - Initial payload determination and testing - Demonstration preparation (UAS test systems material procurement and builds; development of special test fixtures; and demo requirements) - Safe storage effort (capability/requirements development) ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.000	8.392	15.738	0.000	15.738

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Payload Delivery Development is a non-acquisition program that leverages government laboratories and field activities 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., sole-source, competitive) from broad solicitations as necessary to facilitate development and production support and rapid integration of payloads and offboard systems.

E. Performance Metrics

Payload Handling System (PHS)

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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Completion of Preliminary Design Review (PDR). Commencement of Critical Design.

3" Sub Launched Unmanned Aerial System (SL-UAS)
Updated Master Schedule and design down-select. Development of design documentation and interface control requirements. Completion of Detailed Design Review.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / *Advanced Submarine System Development*	Project (Number/Name) 2096 / *Payload Delivery Development*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	WR	NUWC NPT : Newport, RI	0.000	0.000		1.624	May 2017	3.047	Oct 2017	-		3.047	Continuing	Continuing	Continuing
Product Development	WR	NSWC PD : Philadelphia, PA	0.000	0.000		3.150	May 2017	3.488	Oct 2017	-		3.488	Continuing	Continuing	Continuing
Product Development	WR	NUWC KPT : Keyport, WA	0.000	0.000		1.650	May 2017	4.288	Oct 2017	-		4.288	Continuing	Continuing	Continuing
Product Development	WR	PSNS : Bremerton, WA	0.000	0.000		1.598	May 2017	0.628	Oct 2017	-		0.628	Continuing	Continuing	Continuing
Product Development	WR	NSWC CD : West Bethesda, MD	0.000	0.000		0.330	May 2017	1.546	Oct 2017	-		1.546	Continuing	Continuing	Continuing
Product Development	SS/CPFF	AeroVironment : Simi Valley, CA	0.000	0.000		0.000		2.250	Jan 2018	-		2.250	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		8.352		15.247		-		15.247	-	-	-

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Travel	Allot	NAVSEA HQ : Washington DC	0.000	0.000		0.040	May 2017	0.191	Oct 2017	-		0.191	Continuing	Continuing	Continuing
Contractor Management Services	C/CPAF	TBD : TBD	0.000	0.000		0.000		0.300	Oct 2017	-		0.300	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.040		0.491		-		0.491	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		8.392		15.738		-		15.738	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2096 / *Payload Delivery Development*

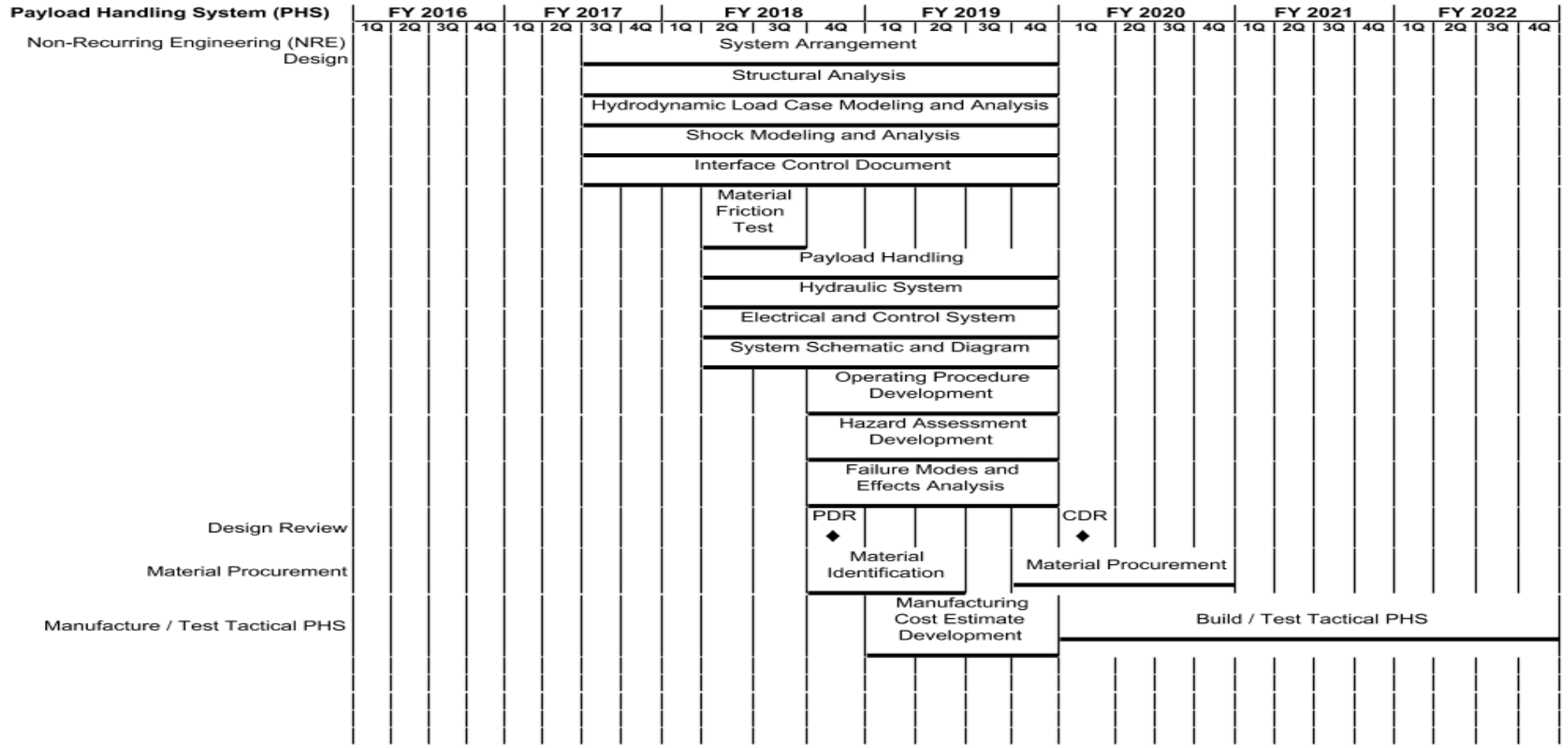

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Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2096 / *Payload Delivery Development*

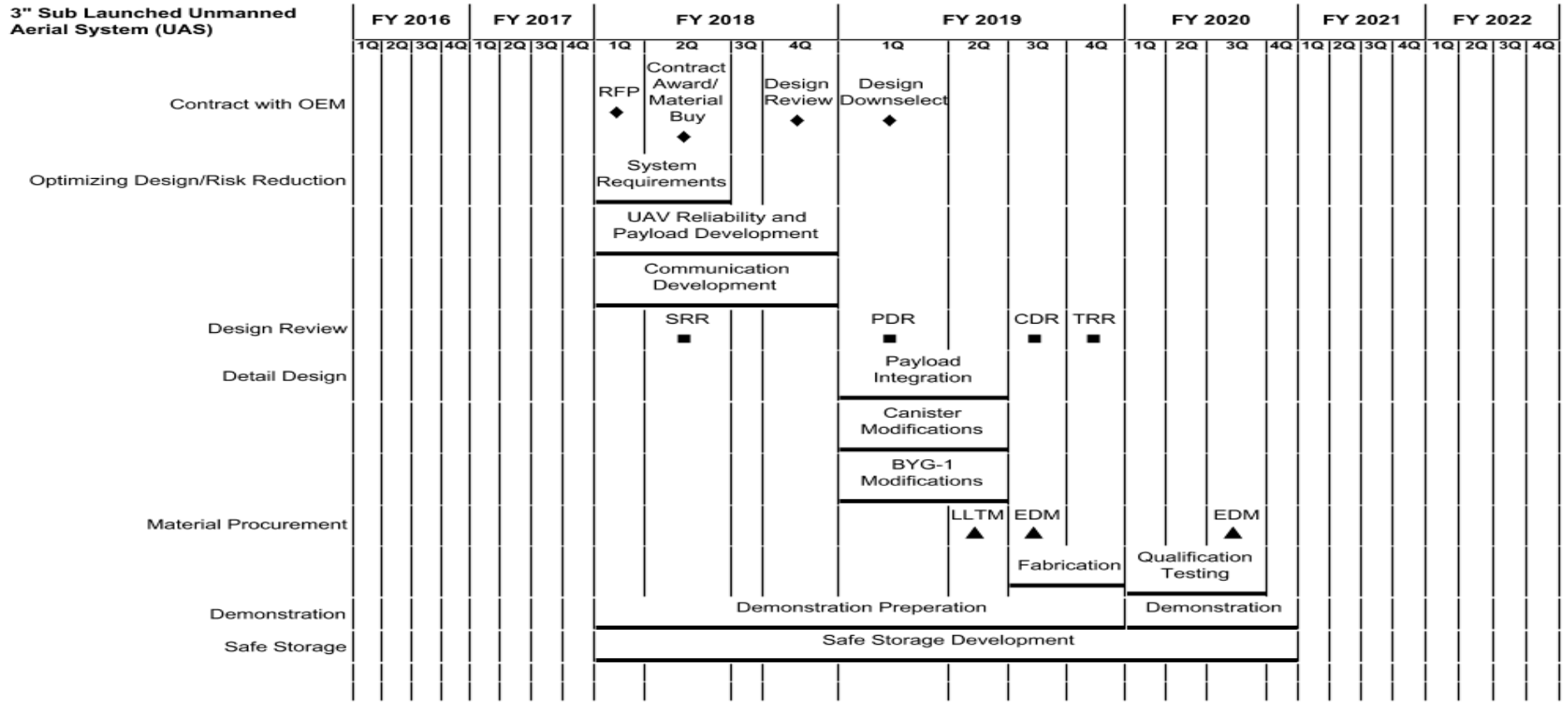

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Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2096 / *Payload Delivery 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	1	2020	1	2020
Material Procurement: Material Identification	4	2018	2	2019
Material Procurement: Material Procurement	4	2019	4	2020

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 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	4	2022
3" Sub Launched Unmanned Aerial System (UAS)				
Contract with OEM: Request for Proposal	1	2018	1	2018
Contract with OEM: Contract Award/ All-up Round Material Purchase	2	2018	2	2018
Contract with OEM: Design Review	4	2018	4	2018
Contract with OEM: Design Downselect	1	2019	1	2019
Optimizing Design/Risk Reduction: System Requirements	1	2018	2	2018
Optimizing Design/Risk Reduction: UAV Reliability and Payload Development	1	2018	4	2018
Optimizing Design/Risk Reduction: Communication Development	1	2018	4	2018
Design Review: System Requirements Review	2	2018	2	2018
Design Review: Preliminary Design Review	1	2019	1	2019
Design Review: Critical Design Review	3	2019	3	2019
Design Review: Test Readiness Review	4	2019	4	2019
Detail Design: Payload Integration	1	2019	2	2019
Detail Design: Canister Modifications	1	2019	2	2019
Detail Design: BYG-1 Modifications	1	2019	2	2019
Material Procurement: Long Lead Time Material	2	2019	2	2019
Material Procurement: Communication Upgrade EDM (a)	3	2019	3	2019
Material Procurement: Communication Upgrade EDM (b)	3	2020	3	2020
Material Procurement: Fabrication	3	2019	4	2019
Material Procurement: Qualification Testing	1	2020	3	2020
Demonstration: Demonstration Preperation	1	2018	4	2019
Demonstration: Demonstration	1	2020	4	2020
Safe Storage: Safe Storage Development	1	2018	4	2020

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / *Advanced Submarine System Development*	Project (Number/Name) 3391 / *SSN/SSGN Survivability Program*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3391: *SSN/SSGN Survivability Program*	0.000	0.000	0.000	8.594	-	8.594	8.454	8.743	8.889	9.063	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: SSN/SSGN Survivability Program	0.000	0.000	8.594	0.000	8.594
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 2016 Accomplishments:
FY 2016 activity funded under Project 2033.

S3P completed two assessments for advanced future requirements for VIRGINIA Class which assisted N97 and Navy Acquisition Program offices enhance stealth in VA Block VI and beyond. S3P completed one major multi-national sea test in support of Acoustic Superiority. This exercise advanced the Navy's understanding of acoustics in tactically relevant environments. S3P also completed the operational deployment of an

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 3391 / *SSN/SSGN Survivability Program*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
experimental environmental sensor suite to inform submarine non-acoustic vulnerabilities for fleet operators. Five data collection events were completed which informed improvements to the sensor suite and requirements for future fleet systems. Additionally, S3P completed sea testing on acoustic arrays, a Radio-Frequency (RF) and communications vulnerability assessment, and assessment of four real-world concerns from the Fleet. Finally, S3P completed its annual SSN/SSGN Operational Survivability Assessment (OSA) for the Flag-level Operations Review Group (ORG). While informing Fleet leadership on vulnerability issues, the OSA also establishes S3P technical work priorities for future years. Full details of S3P FY16 work and the findings of the OSA can be provided in a classified setting. ***FY 2017 Plans:*** FY 2017 activity funded under Project 2033. S3P is addressing gaps in stealth and survivability for current and future SSN/SSGN force to include responding to fleet questions on current tactical vulnerabilities and completion of the annual Operational Survivability Assessment. S3P technical work includes an assessment of VIRGINIA Block V acoustic superiority requirements, analysis of deployment data from the environmental sensor suite deployed in FY16, evaluation of mast and antenna stealth requirements and countermeasure concepts, and continued radio-frequency/ communications and acoustic array vulnerability assessments. The technical work plan includes seven sea-test events and one pier-side data collection event. Additionally, S3P will complete a final report to document and summarize the findings of two years of acoustic vulnerability work (FY15-FY16). All work is designed to inform immediate fleet concerns as well as future stealth and survivability requirements. Detailed information about the nature and impact of FY17 technical work can be provided in a classified setting. ***FY 2018 Base Plans:*** In 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: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 3391 / *SSN/SSGN Survivability Program*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
will conduct sea tests to better characterize vulnerability and evaluate two developmental Tactical Decision Aids. Details can be provided in a classified setting. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.000	0.000	8.594	0.000	8.594

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 will 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 anti-access area denial 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 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-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / *Advanced Submarine System Development*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
9999: *Congressional Adds*	0.000	9.655	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	9.655
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Develop, test and demonstrate numerous high risk advanced submarine control technologies that will improve and/or provide new tactical operational capability at a reduced cost.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017
Congressional Add: Advanced submarine control	9.655	0.000
FY 2016 Accomplishments: Designed, developed and tested advanced submarine control related technologies that improved submarine control, operational profile, stealth, enhanced ship control and maneuverability and mitigated risks. Performed hydrodynamic and hydroacoustics analysis on advanced submarine control systems to insure performance requirements were met. Performed required land-based and in-water qualification testing (e.g., shock, pressure, Electromagnetic Interference (EMI), and tested and evaluated control system technologies used in external applications using innovative designs and materials to alleviate corrosion and signature issues.		
FY 2017 Plans: Conduct non-recurring engineering and analysis on advanced submarine control related technologies, conduct stealth technology assessments and down select technologies for testing, commence manufacturing and/or procure advanced submarine control and stealth technologies, and perform at-sea operational testing and demonstrations.		
Congressional Adds Subtotals	9.655	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 9999 / *Congressional Adds*

E. Performance Metrics

Commence design of stealth and controller component technologies. Perform technical analysis, land-based and in-water qualification testing including shock, pressure and Electromagnetic Interference (EMI).

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603562N *I Submarine Tactical Warfare Sys*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	70.124	10.172	8.782	13.834	-	13.834	9.545	11.448	11.680	11.910	Continuing	Continuing
0770: *Adv Sub Supp Equip Prog*	19.698	4.051	4.429	4.155	-	4.155	4.396	4.717	4.821	4.919	Continuing	Continuing
1739: *Submarine Arctic W/F Development*	50.426	6.121	4.353	9.679	-	9.679	5.149	6.731	6.859	6.991	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: FY 2018 Navy					Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*		R-1 Program Element (Number/Name) PE 0603562N *I Submarine Tactical Warfare Sys*			
B. Program Change Summary ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**
Previous President's Budget	10.371	8.782	13.863	-	13.863
Current President's Budget	10.172	8.782	13.834	-	13.834
Total Adjustments	-0.199	0.000	-0.029	-	-0.029
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.200	0.000			
• Rate/Misc Adjustments	0.001	0.000	-0.029	-	-0.029

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603562N / *Submarine Tactical Warfare Sys*	Project (Number/Name) 0770 / *Adv Sub Supp Equip Prog*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0770: *Adv Sub Supp Equip Prog*	19.698	4.051	4.429	4.155	-	4.155	4.396	4.717	4.821	4.919	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 Advanced Imaging Project Development projects include the development of the Affordable Modular Panoramic Photonics Mast (AMPPM) which is the prototype for the Tactically Oriented Technology Insertion Mast (TOTIM), that introduces several groundbreaking technologies such as individually replaceable capability modules (allowing a vast array of capability combinations without requiring redesign) as well as presenting live 360 degree High Definition video (greatly increasing situational awareness and reducing scope exposure time.) Also in support of the Advance Imaging Project Development are; Automatic Aircraft Cueing, RF Vulnerability Reduction (RAS), ONR Vulnerability Assessment Tools, GPS Denied Navigation, Meteorological Sensors (METOC), Passive Ranging Testing, RIF - Spinel Hyper - hemisphere, Anti reflective Coating Spherical Domes, Volumetric Atmospheric Modeling, Low Power Fiber Delivered Laser Range Finder (planned), Reduced Cost Fabrication of Optical Sapphire Hyper-hemispheres (planned), Navy Tactical Cloud Integration (planned), Offboard Sensor Suite (planned), Imaging Buoy (planned), and a Project Arrangement (PA) with Australia covering Electromagnetic Spectrum Sensor System Simulation & Development for model-based mission planning and a Coalition Warfare Program (CWP) covering periscope vulnerability.
The Advanced EW Development projects include the development of: Enhanced DeInterleavers, Low Probability of Intercept (LPI) Direction Finding (DF), High Speed Network, Embedded Built-in Test (BIT), EW on-Board Trainer (OBT), Digital EWP, Extremely Wideband Digital Receiver (NATO Nunn Project with NAVAIR and Australia), Multi-function Modular Mast (MMM) Payloads, Digital Precision Direction Finding, Multi-Functional Apertures, disposable decoy, ISR and tethered Buoys and Antennas, RF over Fiber (RFoF), Human Machine Interface (HMI)Improvements, and Next Generation EW Systems Algorithms and Applications. New in FY17 is the acceleration of support for an EW Disposable Decoy Buoy capability addressing the U.S. Navy Submarine Force (SUBFOR) requirement to provide a Submarine Launched Decoy Buoy.

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.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603562N / *Submarine Tactical Warfare Sys*	**Project (Number/Name)** 0770 / *Adv Sub Supp Equip Prog*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Advanced Imaging Project Development	2.644	3.247	2.874	0.000	2.874
Articles:	-	-	-	-	-
FY 2016 Accomplishments:					
360 Imaging TOTIM Image Processing Development					
RF Vulnerability Reduction (RAS) Lab Test					
Automatic Aircraft Cueing Lab Test					
GPS Denied Navigation Continued Development					
Submarine METOC Continued Development					
CWP Periscope Vulnerability Lab Test/At-Sea Test					
PA Electromagnetic Spectrum Sensor System Simulation Development					
Low Power Fiber Delivered Laser Range Finder Development					
Reduced Cost Fabrication of Optical Sapphire Hyper-hemispheres Development					
FY 2017 Plans:					
TOTIM Land Based ISIS Testing					
RF Vulnerability Reduction (RAS) Lab Test					
Automatic Aircraft Cueing Lab Test					
SBIR- Passive Ranging Development					
GPS Denied Navigation Testing					
Meteorological Sensors Testing					
Low Power Fiber Delivered Laser Range Finder Continued Development					
Reduced Cost Fabrication of Optical Sapphire Hyper-hemispheres Continued Development					
Anti - reflective Coating Spherical Domes Development					
Volumetric Atmospheric Modeling Development					
PA Electromagnetic Spectrum Sensor System Simulation Development					
FY 2018 Base Plans:					
360 Degree Imaging TOTIM Development					
Automatic Aircraft Cueing Lab Test					
GPS Denied Navigation Lab Test					
Meteorological Sensors Testing					
Low Power Fiber Delivered Laser Range Finder Lab Test					
Reduced Cost Fabrication of Optical Sapphire Hyper-hemispheres Lab Test					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603562N / *Submarine Tactical Warfare Sys*	**Project (Number/Name)** 0770 / *Adv Sub Supp Equip Prog*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Anti - reflective Coating Spherical Domes Development Volumetric Atmospheric Modeling Development Navy Tactical Cloud Integration Development PA Electromagnetic Spectrum Sensor System Simulation Development ***FY 2018 OCO Plans:*** N/A					
Title: Advanced Electronic Warfare Support (EW) Project Development	1.407	1.182	1.281	0.000	1.281
Articles:	-	-	-	-	-
FY 2016 Accomplishments: ES On-Board Trainer (OBT) Development Enhanced DeInterleavers Lab Demo # 2 Human Machine Interface (HMI) Continued Development LPI DF/Localization Lab Test Digital Early Warning Receiver (EWR) Development Extremely Wideband Digital Receiver Development EW Digital Direction Finding Development Next Gen EW System Development MMM Payload (CEAS) Development Disposable Buoy - Submarine Launched Decoy baseline Lab Test Disposable Buoy - Modular Expendable Decoy enhancements Development Disposable Buoy - Modular Expendable Intelligence Surveillance and reconnaissance (ISR) Development Tethered Buoy- Modular Tethered Antenna Development Tethered Buoy - Radio Frequency over Fiber (RFoF) development					
FY 2017 Plans: ES OBT Test Enhanced DeInterleavers Pierside/MTV Test LPI DF/Localization Pierside / MTV Test MMM (CEAS) Lab Test Precision DF Lab Test Disposable Buoy - Submarine Launched Decoy Baseline Lab Test					
FY 2018 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603562N / *Submarine Tactical Warfare Sys*	**Project (Number/Name)** 0770 / *Adv Sub Supp Equip Prog*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
ES OBT Lab Demo Enhanced DeInterleavers Lab Test Human Machine Interface (HMI) Lab Demo LPI DF Lab Test EWP Phase II Development Extremely Wideband Digital Receiver Development EW Digital Direction Finding Development MMM (CEAS) Development Disposable Buoy Modular Expendable Decoy enhancements - Development S&T Disposable Buoy Modular Expendable Intelligence Surveillance and reconnaissance (ISR) Development S&T Tethered Buoy Modular Tethered Antenna Development S&T Tethered Buoy Radio Frequency over Fiber (RFoF) Development S&T ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	4.051	4.429	4.155	0.000	4.155

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 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-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603562N / *Submarine Tactical Warfare Sys*	Project (Number/Name) 1739 / *Submarine Arctic W/F Development*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
1739: *Submarine Arctic W/F Development*	50.426	6.121	4.353	9.679	-	9.679	5.149	6.731	6.859	6.991	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 FY18 funding ($+5.367M) is to fund the FY18 major TACDEV/TORPEX ICEX that requires additional aviation, personnel, logistics, and torpedo recovery resources than a non-firing (TACDEV only) ICEX.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Conduct ICEX and Arctic Transit Mission, ICEX Workup and Training, Ice Camps	6.121	4.353	9.679	0.000	9.679
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Conducted Arctic work-up training on 10 submarines, completed the ICEX 2016 mission, and Ice Camp in support of ICEX 2016. Supported 6 Arctic deployments, including one inter-Fleet transfer, as directed by the SUBFOR Commanders. Investigated and deployed new systems for Arctic submarine support. Supported testing and Tactical Development (TACDEV) required to improve submarine Arctic operability and warfighting.					
FY 2017 Plans: 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. Support testing and tactical development required to improve submarine Arctic operability and warfighting. Initiate planning for ICEX mission 1-2018 and Ice Camp 1-2018.					
FY 2018 Base Plans: Conduct Arctic work-up training, ICEX mission 1-2018, and Ice Camp 1-2018.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603562N / *Submarine Tactical Warfare Sys*	**Project (Number/Name)** 1739 / *Submarine Arctic W/F Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
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 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	6.121	4.353	9.679	0.000	9.679

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-2, RDT&E Budget Item Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603563N *I Ship Concept Advanced Design*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	180.150	10.446	14.590	36.891	-	36.891	47.662	46.089	32.878	11.239	Continuing	Continuing
2196: *Design, Tools, Plans and Concepts*	1.907	0.440	0.432	23.309	-	23.309	38.149	36.886	23.051	0.921	Continuing	Continuing
3161: *NAVSEA Tech Authority*	172.650	10.006	9.947	13.582	-	13.582	9.513	9.203	9.827	10.318	Continuing	Continuing
3376: *Strategic Sealift*	5.593	0.000	4.211	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	9.804

A. Mission Description and Budget Item Justification

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, 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 Platform Design and Certification Tools, Ship Systems Engineering/Modular Ship Systems Development, Alternative Hull, Mechanical & Electrical Systems Engineering, Mission Capability, Affordability and Sustainment Engineering and Cybersecurity. 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 continue to directly support interoperability testing and certification requirements for deploying battle groups, development and certification of Operator Guidance tools for surface combatants (CG 47, DDG 51, DDG 1000), flexible and modular warship analyses, and development of specifications and processes to reduce platform production costs.

Tasks within this project include R&D efforts focused on increasing sustainment technologies for aluminum combatants, tools to execute the CG 47 Cracking Task Force recommendations, 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. FY2016 and prior years (FY2014 and earlier) efforts were funded under NDSF BA 04 Project 3116 Strategic Sealift Research and Development. FY2018 and out-year efforts are funded under National Defense Sealift Fund (NDSF) BA 04 Project 3116 Strategic Sealift Research and Development.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	10.459	14.590	17.274	-	17.274
Current President's Budget	10.446	14.590	36.891	-	36.891
Total Adjustments	-0.013	0.000	19.617	-	19.617
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.013	0.000			
• Program Adjustments	0.000	0.000	19.460	-	19.460
• Rate/Misc Adjustments	0.000	0.000	0.157	-	0.157

Change Summary Explanation

FY 2018 increased by $19.617 million net for program changes, specifically:
$+15.385 million for Future Surface Combatant development;
$+7.500 million for DDG Flt III ECP;
$+3.000 million cybersecurity vulnerability and resolution test capability;
and $-6.425 million appropriation transfer to NDSF (National Defense Sealift Fund).

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603563N / *Ship Concept Advanced Design*	Project (Number/Name) 2196 / *Design, Tools, Plans and Concepts*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2196: *Design, Tools, Plans and Concepts*	1.907	0.440	0.432	23.309	-	23.309	38.149	36.886	23.051	0.921	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: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 2196 / *Design, Tools, Plans and Concepts*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Ship Concepts and Mission Need Analysis	0.440	0.432	0.452	0.000	0.452
Articles:	-	-	-	-	-
Description: Develop ship concepts and perform analysis for potential ships and Force Architecture 10-30 years out in shipbuilding plan. ***FY 2016 Accomplishments:*** Improved tools that relate ship costs to ship capabilities. Explored concepts of surface ships that can deploy swarms of unmanned autonomous systems, and react to such swarms deployed by the enemy. Analyzed the impact of distributed high energy storage systems on ship design. ***FY 2017 Plans:*** Participate in force architecture and war-gaming efforts to improve the understanding of performance and mobility of future surface combatants. ***FY 2018 Base Plans:*** Initiate study into an Engineering Change Proposal for the Destroyer Payload Module (DPM) to combat emerging threats as defined in the Defense Planning Guidance. ***FY 2018 OCO Plans:*** N/A					
Title: Future Surface Combatant Studies	0.000	0.000	22.857	0.000	22.857
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. ***FY 2016 Accomplishments:*** N/A ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:***					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 2196 / *Design, Tools, Plans and Concepts*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Conduct ship design and unmanned vehicle studies to support analytic foundation for the development of a Future Surface Combatant post Capabilities Based Assessment (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, launch & recovery (L&R) system concepts Develop technical requirements and standards for unmanned system autonomous operations, define host ship technical requirements and interface standards ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.440	0.432	23.309	0.000	23.309

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• RDTEN/0204202N: *DDG-1000*	101.724	45.642	140.500	-	140.500	120.412	15.966	0.000	0.000	0.000	1,759.234
• RDTEN/0603512N: *Carrier Systems Development*	8.213	7.605	9.296	-	9.296	5.918	5.778	5.904	6.024	Continuing	Continuing
• RDTEN/0603564N: *Ship Preliminary Design/Feasibility*	3.213	15.805	12.012	-	12.012	18.990	17.976	10.842	10.132	Continuing	Continuing
• RDTEN/0604567N: *Ship Contract Design/Live Fire T&E*	38.060	63.311	67.166	-	67.166	69.618	53.390	55.474	56.550	Continuing	Continuing
• RDTEN/0603582N: *Combat System Integration*	32.020	26.530	24.674	-	24.674	26.110	25.672	25.360	25.707	Continuing	Continuing

Remarks

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 2196 / *Design, Tools, Plans and Concepts*

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: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 2196 / *Design, Tools, Plans and Concepts*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	C/CPFF	Various Contractors : Various	0.584	0.000		0.000		0.715	Feb 2018	-		0.715	Continuing	Continuing	Continuing
Systems Engineering	WR	NSWC : Various	0.906	0.000		0.000		1.375	Feb 2018	-		1.375	Continuing	Continuing	Continuing
Engineering Development	C/CPFF	Various Contractors : Various	0.171	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Engineering Development	WR	NSWC CD : Carderock, MD	0.197	0.440	May 2016	0.432	Jan 2017	8.000	May 2018	-		8.000	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	C/CPFF	Systems Planning and Alalysis Inc : NAVSEA	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
Test & Evaluation / Systems Engineering	C/CPFF	Various Contracts : Various	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
Systems Engineering	WR	NSWC DD : Dahlgren, VA	0.000	0.000		0.000		5.500	Nov 2017	-		5.500	0.000	5.500	-
Systems Engineering	WR	NSWC PL : Philadelphia, PA	0.000	0.000		0.000		3.125	Nov 2017	-		3.125	0.000	3.125	-
Systems Engineering	WR	SPAWAR : San Diego, CA	0.000	0.000		0.000		1.375	Nov 2017	-		1.375	0.000	1.375	-
Systems Engineering	WR	JHU APL : Baltimore, MD	0.000	0.000		0.000		3.219	Feb 2018	-		3.219	0.000	3.219	-
		Subtotal	1.907	0.440		0.432		23.309		-		23.309	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	1.907	0.440		0.432		23.309		-		23.309	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 2196 / *Design, Tools, Plans and Concepts*

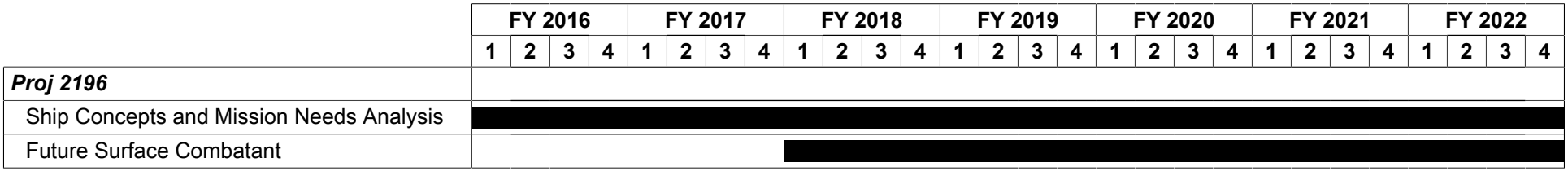

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 2196 / *Design, Tools, Plans and Concepts*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2196				
Ship Concepts and Mission Needs Analysis	1	2016	4	2022
Future Surface Combatant	1	2018	4	2022

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603563N / *Ship Concept Advanced Design*	Project (Number/Name) 3161 / *NAVSEA Tech Authority*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3161: *NAVSEA Tech Authority*	172.650	10.006	9.947	13.582	-	13.582	9.513	9.203	9.827	10.318	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

All CPSD Pillars have been rebaselined to align with the decreased budget.

A. Mission Description and Budget Item Justification

This project has been established to support NAVSEA Technical Authority through coordinated, collaborative, cross-platform systems development in advanced capabilities across business lines through development of processes, procedures, and tools necessary to develop future surface ship force structures; advanced surface ship and unmanned surface vehicle concepts; interoperability; and development of systems level engineering criteria and options to support the current fleet, future pre-acquisition and advanced concepts mission needs analysis, SCN, and R&D planning. The objective is 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 (Government or commercial) 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.

All CPSD Pillars have been rebaselined to align with the decreased budget and are comprised of 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: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Platform Concept Advanced Development (CPSD 1.0)	0.410	0.159	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. ***FY 2016 Accomplishments:*** Provided guidance to initial adopters of radically new manufacturing technology. ***FY 2017 Plans:*** Support the execution of cross platform aspects and specification development for Unmanned Vehicles (UXV's) modular future surface combatants. Support innovation by examining capabilities that may be mixed and matched to various platforms, depending on the mission with regard to payloads. ***FY 2018 Base Plans:*** N/A. ***FY 2018 OCO Plans:*** N/A.					
Title: Platform Design and Certification Tools/Engineering and Tech Data Exchange (CPSD 2.0)	0.431	0.244	1.313	0.000	1.313
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. ***FY 2016 Accomplishments:*** Validated the use of modeling and simulation to test hardware to big and powerful to safely test by conventional physical methods. ***FY 2017 Plans:*** Develop preliminary specification and design requirements for the use of new materials and material configurations on surface combatants. Develop an analytical tool for surface ship Operator Guidance in representative sea states. Simulate ship motions in prototypical environmental conditions sufficient to develop a broad spectrum of operating conditions likely to be seen by current and planned surface combatants. ***FY 2018 Base Plans:***					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
*Note - Increase from FY17 to FY18 ($1.069M) is required to develop additional analytical capabilities (i.e. tools to simulate various sea states and ship motions when operating in those sea states as comparable to the various hull form platforms). Additionally, preliminary design specifications must be developed to establish material selection criteria. 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. ***FY 2018 OCO Plans:*** N/A.					
Title: Ship Systems Engineering /Modular Ship Systems Development (CPSD 3.0)	1.138	1.742	2.093	0.000	2.093
Articles:	-	-	-	-	-
Description: This effort supports Ship system development with a focus on technology transition, modularity and ship system technology integration to support ongoing ship modernization. ***FY 2016 Accomplishments:*** Performed root cause analysis of aluminum plate cracking. Performed Sea Trials for Insulation Seam Tape tasking that replaces costly current processes using hazardous materials. Completed Electromagnetic Probability of Effect Tool (EMPAT), Adhesively Bonded Pins and specific Additive Manufactured characterization testing which will transition to be developed into a specification document. ***FY 2017 Plans:*** Continue R&D of methods to rapidly quantify the effects of corrosion on steel structure (stiffeners and plates). Analyze the logistical and engineering aspects of the application of 3D modeling and printing technology in metals and powders. Continue assessment, verification and validation of repair and technology solutions for aluminum cracking. ***FY 2018 Base Plans:*** 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. ***FY 2018 OCO Plans:***					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A.					
Title: High Speed Ships and Craft Engineering (CPSD 5.0)	2.723	0.204	0.000	0.000	0.000
Articles:	-	-	-	-	-
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.					
FY 2016 Accomplishments: Developed analytical tools for the generation of surface ship Operator Guidance products. Completed Validation, Verification & Accreditation (VV&A) of the simulation tool for characterizing ship motions in environments not within ability to test. Simulated runs of ship motions in prescribed environmental conditions required to develop the surface ship Operator Guidance. Supported the integration of the Operator Guidance capability on the ship and associated training guidance for the ship's crew. Supported the survivability of testing and analysis.					
FY 2017 Plans: Complete the accreditation of the TEMPEST software tool to support the Surface Ship Operator Guidance.					
FY 2018 Base Plans: N/A.					
FY 2018 OCO Plans: N/A.					
Title: Alternative Power Systems Engineering (CPSD 6.0)	0.000	0.158	0.500	0.000	0.500
Articles:	-	-	-	-	-
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.					
FY 2016 Accomplishments: N/A.					
FY 2017 Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Develop energy harvesting technology for mobility and primary mission systems. Continue to investigate concepts supporting Forward Deployed Energy (FDE) techniques for refueling unmanned vehicles. Develop preliminary requirements for surface combatant weapon and HM&E module interfaces. ***FY 2018 Base Plans:*** Investigate trimaran ship component model data to support the Project Agreement with Japan. ***FY 2018 OCO Plans:*** N/A.					
Title: Embedded Interoperability (I/O) Engineering (CPSD 8.0) ***Articles:*** ***Description:*** This effort establishes and executes a dedicated process for evaluating the interoperability performance of warfare systems early in the acquisition cycle, prior to certification. Embedded I/O ensures that fewer mission critical system failures degrade the ultimately fielded war fighting capability. Focus on emerging Open Architecture warfare systems, including LCS Class. ***FY 2016 Accomplishments:*** Explored methods of further reducing costs of achieving certified interoperable systems. Researched ways to standardize and reduce the number of surface electro-optic and infrared systems and their interfaces. Further improved the generation of strike group interoperability and the generation of Capabilities and Limitations documents. Investigated and promoted interoperability between Electro Optic and Infrared (EO/IR) Systems in fleet. ***FY 2017 Plans:*** Continue to explore methods of further reducing costs of achieving certified interoperable systems. Continue exploring ways to standardize and reduce the number of surface electro-optic and infrared systems and their interfaces. ***FY 2018 Base Plans:*** N/A. ***FY 2018 OCO Plans:***	0.304 -	0.084 -	0.000 -	0.000 -	0.000 -

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A.					
Title: Mission Capability Systems Engineering (CPSD 9.0) ***Articles:*** ***Description:*** This effort supports the development of force-level systems engineering criteria and guiance 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. ***FY 2016 Accomplishments:*** N/A. ***FY 2017 Plans:*** Study concepts of modularity and open architecture in combat systems and propose parallel concepts for hull, mechanical, and electrical systems.Develop towed array performance assessment tool linking array element operational status and mission profile. ***FY 2018 Base Plans:*** *Note - Increase from FY17 to FY18 ($0.962M) is required to fund the 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). Validate required mission performance against fully functional and degraded array conditions. ***FY 2018 OCO Plans:*** N/A.	0.000 -	0.538 -	1.500 -	0.000 -	1.500 -
Title: Cybersecurity (CPSD 13.0) ***Articles:*** ***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).	5.000 -	4.818 -	8.176 -	0.000 -	8.176 -

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
FY 2016 Accomplishments: Researched and developed various cross-platform cybersecurity solutions including but not limited to: situational awareness tools, boundary defense capabilities, cyber security optimized network design, and operational indifference to malicious intent. Researched new techniques or methodologies to ensure secure network traffic (authenticated and encrypted) for Navy Control Systems (NCS). Conducted test and evaluation of cybersecurity technologies in shipboard operational environment. Continued development of specifications and standards for Cybersecurity of NCS. ***FY 2017 Plans:*** 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. Expand capability beyond Destroyer Fleet to Carriers. Continue development of specifications and standards for Cybersecurity of NCS. ***FY 2018 Base Plans:*** *Note - Increase from FY17 to FY18 ($3.358M) is required to 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. 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. ***FY 2018 OCO Plans:*** N/A.					
Title: Future Surface Combatant Studies (CPSD 14.0)	0.000	2.000	0.000	0.000	0.000
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 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. ***FY 2016 Accomplishments:*** N/A ***FY 2017 Plans:*** Development of pre-milestone A activities (especially pre-concept) in support of all future surface combatants and unmanned surface vehicles, specifically the FSC Analysis of Alternatives (AoA). ***FY 2018 Base Plans:*** The FSC studies project moves to PU 2196 in FY18. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	10.006	9.947	13.582	0.000	13.582

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• RDTEN/0204202N: *DDG-1000*	101.724	45.642	140.500	-	140.500	120.412	15.966	0.000	0.000	0.000	1,759.234
• RDTEN/0603512N: *Carrier Systems Development*	8.213	7.605	9.296	-	9.296	5.918	5.778	5.904	6.024	Continuing	Continuing
• RDTEN/0603564N: *Ship Preliminary Design/ Feasibility Studies*	3.213	15.805	12.012	-	12.012	18.990	17.976	10.842	10.132	Continuing	Continuing
• RDTEN/0604567N: *Ship Contract Design/Live Fire T&E*	38.060	63.311	67.166	-	67.166	69.618	53.390	55.474	56.550	Continuing	Continuing
• RDTEN/0603582N: *Combat System Integration*	32.020	26.530	24.674	-	24.674	26.110	25.672	25.360	25.707	Continuing	Continuing

Remarks

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 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: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 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	0.000	0.200	May 2016	0.200	May 2017	0.200	May 2018	-		0.200	Continuing	Continuing	Continuing
Systems Engineering	WR	NSWC CD : Carderock, MD	0.000	0.800	Dec 2015	1.650	Dec 2016	1.000	Dec 2017	-		1.000	Continuing	Continuing	Continuing
Systems Engineering	WR	NSWC PL : Philadelphia, PA	0.000	0.874	May 2016	0.874	May 2017	0.872	May 2018	-		0.872	Continuing	Continuing	Continuing
Systems Engineering	WR	NRL : Washington, D.C.	0.000	0.046	Aug 2016	0.046	Aug 2017	0.046	Aug 2018	-		0.046	Continuing	Continuing	Continuing
Systems Engineering	C/CPFF	ALION : Wahington, D.C.	0.000	0.120	May 2016	0.120	May 2017	0.120	May 2018	-		0.120	Continuing	Continuing	Continuing
Systems Engineering	C/CPFF	CSC : Washington, D.C.	0.000	0.300	Jul 2016	0.300	Jul 2017	0.300	Jul 2018	-		0.300	Continuing	Continuing	Continuing
Systems Engineering	MIPR	Army Research Lab : Aberdeen Proving Ground, MD	0.000	0.075	Jul 2016	0.075	Jul 2017	0.075	Jul 2018	-		0.075	Continuing	Continuing	Continuing
Engineering Development	WR	NUWC Newport : Newport, RI	0.000	0.132	Dec 2015	0.132	Dec 2016	0.382	Dec 2017	-		0.382	Continuing	Continuing	Continuing
Engineering Development	WR	NUWC Keyport : Keyport, WA	0.000	0.150	Nov 2015	0.150	Nov 2016	0.150	Nov 2017	-		0.150	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering Development	WR	NSWC Crane : Crane, IN	0.000	0.169	Dec 2015	0.169	Dec 2016	0.169	Dec 2017	-		0.169	Continuing	Continuing	Continuing
Engineering Development	WR	NSWC DD : Dahlgren, VA	0.000	0.425	May 2016	0.425	May 2017	0.800	May 2018	-		0.800	Continuing	Continuing	Continuing
Engineering Development	WR	NSWC CD : Carderock, MD	0.000	1.324	Dec 2015	0.265	Dec 2016	1.775	Dec 2017	-		1.775	Continuing	Continuing	Continuing
Engineering Development	WR	NSWC PD : Philadelphia, PA	0.000	0.244	Nov 2015	0.244	Nov 2016	0.294	Nov 2017	-		0.294	Continuing	Continuing	Continuing
Engineering Development	C/CPFF	CSC : Washington, D.C.	0.000	0.100	Jul 2016	0.100	Jul 2017	0.100	Jul 2018	-		0.100	Continuing	Continuing	Continuing
Engineering Development	C/CPFF	JHU APL : Baltimore, MD	0.000	0.200	May 2016	0.200	May 2017	0.200	May 2018	-		0.200	Continuing	Continuing	Continuing
Demonstration & Evaluation	WR	NUWC Keyport : Keyport, WA	0.000	0.050	Mar 2016	0.050	Mar 2017	0.050	Mar 2018	-		0.050	Continuing	Continuing	Continuing
Demonstration & Evaluation	WR	NSWC CD : Carderock, MD	0.000	0.250	Dec 2015	0.250	Dec 2016	0.250	Dec 2017	-		0.250	Continuing	Continuing	Continuing
Demonstration & Evaluation	WR	NSWC PD : Philadelphia, PA	0.000	0.125	Dec 2015	0.125	Dec 2016	0.125	Dec 2017	-		0.125	Continuing	Continuing	Continuing
Cybersecurity Technologies	C/CPFF	JHU/APL : Baltimore, MD	0.000	1.585	May 2016	1.585	May 2017	3.791	May 2018	-		3.791	Continuing	Continuing	Continuing
Cybersecurity Technologies	C/CPFF	MITRE : McLean, VA	0.000	0.304	Oct 2015	0.304	Oct 2016	0.500	Oct 2017	-		0.500	Continuing	Continuing	Continuing
Cybersecurity Technologies	MIPR	PNNL DOE : Richland, WA	0.000	0.300	Jul 2016	0.300	Jul 2017	0.300	Jul 2018	-		0.300	Continuing	Continuing	Continuing
Engineering Development	WR	PHD NSWC : Port Hueneme, CA	0.000	0.030	May 2016	0.030	May 2017	0.030	May 2018	-		0.030	Continuing	Continuing	Continuing
		Subtotal	171.855	7.803		7.594		11.529		-		11.529	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	WR	NUWC Newport : Newport, RI	0.000	0.100	Dec 2015	0.100	Dec 2016	0.100	Dec 2017	-		0.100	Continuing	Continuing	Continuing
Systems Engineering	WR	NSWC DD : Dahlgren, VA	0.000	0.100	Mar 2016	0.100	Mar 2017	0.100	Mar 2018	-		0.100	Continuing	Continuing	Continuing
Systems Engineering	WR	NSWC CD : Carderock, MD	0.000	0.250	Dec 2015	0.250	Dec 2016	0.250	Dec 2017	-		0.250	Continuing	Continuing	Continuing
Systems Engineering	WR	NSWC PD : Philadelphia, PA	0.000	0.125	Oct 2015	0.125	Oct 2016	0.175	Oct 2017	-		0.175	Continuing	Continuing	Continuing
Systems Engineering	C/CPFF	G2OPS : Virginia Beach, VA	0.000	0.250	Mar 2016	0.250	Mar 2017	0.250	Mar 2018	-		0.250	Continuing	Continuing	Continuing
Systems Engineering	C/CPFF	JHU/APL : Baltimore, MD	0.000	0.100	May 2016	0.100	May 2017	0.100	May 2018	-		0.100	Continuing	Continuing	Continuing
		Subtotal	0.000	0.925		0.925		0.975		-		0.975	-	-	-

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test Planning & Execution	WR	NSWC DD : Dahlgren, VA	0.000	0.020	Dec 2015	0.020	Dec 2016	0.020	Dec 2017	-		0.020	Continuing	Continuing	Continuing
Test Planning & Execution	WR	NSWC CD : Carderock, MD	0.000	0.450	Dec 2015	0.250	Dec 2016	0.250	Dec 2017	-		0.250	Continuing	Continuing	Continuing
Test Planning & Execution	C/CPFF	JHU/APL : Baltimore, MD	0.000	0.100	May 2016	0.450	May 2017	0.100	May 2018	-		0.100	Continuing	Continuing	Continuing
		Subtotal	0.000	0.570		0.720		0.370		-		0.370	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603563N / *Ship Concept Advanced Design*	Project (Number/Name) 3161 / *NAVSEA Tech Authority*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
PM/Travel	Allot	NAVSEA HQ : Washington, DC	0.650	0.050	May 2016	0.050	Dec 2016	0.050	Dec 2017	-		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	0.000	0.032	Dec 2015	0.032	Dec 2016	0.032	Dec 2017	-		0.032	Continuing	Continuing	Continuing
Program Mgmt Spt	WR	NSWC DD : Dahlgren, VA	0.000	0.100	Dec 2015	0.100	Dec 2016	0.100	Dec 2017	-		0.100	Continuing	Continuing	Continuing
Program Mgmt Spt	WR	NSWC CD : Carderock, MD	0.000	0.250	Nov 2015	0.250	Nov 2016	0.250	Nov 2017	-		0.250	Continuing	Continuing	Continuing
Program Mgmt Spt	C/CPFF	CSC : Washington, D.C.	0.000	0.105	Jul 2016	0.105	Jul 2017	0.105	Jul 2018	-		0.105	Continuing	Continuing	Continuing
Program Mgmt Spt	C/FFP	ARDEC : Picatinny Arsenal, NJ	0.000	0.100	Jun 2016	0.100	Jun 2017	0.100	Jun 2018	-		0.100	Continuing	Continuing	Continuing
Program Mgmt Spt	MIPR	PNNL DOE : Richland, WA	0.000	0.071	Jul 2016	0.071	Jul 2017	0.071	Jul 2018	-		0.071	Continuing	Continuing	Continuing
		Subtotal	0.795	0.708		0.708		0.708		-		0.708	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	172.650	10.006		9.947		13.582		-		13.582	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*

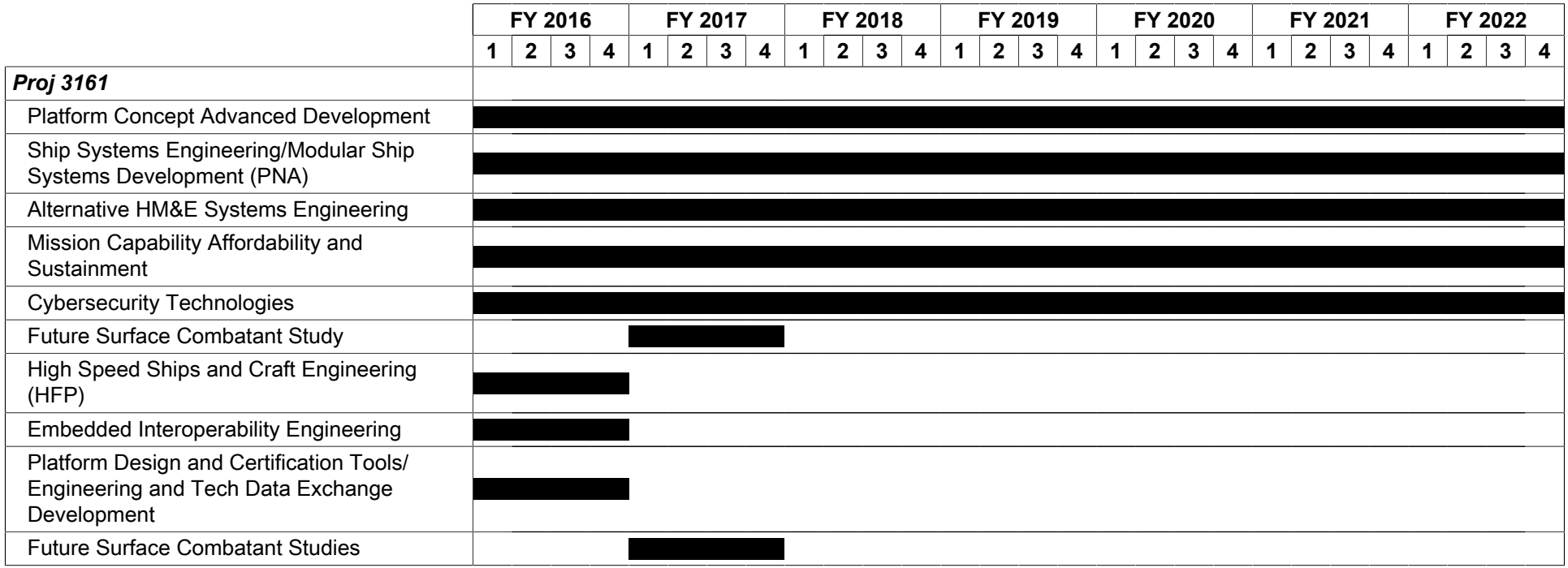

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3161				
Platform Concept Advanced Development	1	2016	4	2022
Ship Systems Engineering/Modular Ship Systems Development (PNA)	1	2016	4	2022
Alternative HM&E Systems Engineering	1	2016	4	2022
Mission Capability Affordability and Sustainment	1	2016	4	2022
Cybersecurity Technologies	1	2016	4	2022
Future Surface Combatant Study	1	2017	4	2017
High Speed Ships and Craft Engineering (HFP)	1	2016	4	2016
Embedded Interoperability Engineering	1	2016	4	2016
Platform Design and Certification Tools/Engineering and Tech Data Exchange Development	1	2016	4	2016
Future Surface Combatant Studies	1	2017	4	2017

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603563N / *Ship Concept Advanced Design*	Project (Number/Name) 3376 / *Strategic Sealift*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3376: *Strategic Sealift*	5.593	0.000	4.211	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	9.804
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: FY 2016 and prior year (FY 14 and earlier) efforts were financed under the National Sealift Defense Fund (NDSF) BA 04, Project 3116 (Strategic Sealift Research and Development. FY 2017 efforts are financed under this program element. FY2018 and out-year funds are reinstated under the National Defense Sealift Fund (NDSF) BA 04, Project 3116 (Strategic Sealift Research and Development).

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Shipboard Crane Systems/Shipboard Cargo Systems	0.000	1.311	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2016 Accomplishments: N/A					
FY 2017 Plans: FY17 - Continued investigation and demonstration of shipboard crane/cargo system improvements. Demonstrated weapons transfer feasibility.					
FY 2018 Base Plans: N/A					
FY 2018 OCO Plans: N/A					
Title: Sealift Concept Development	0.000	1.900	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2016 Accomplishments:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3376 / *Strategic Sealift*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A ***FY 2017 Plans:*** FY17 - Continued providing Advanced Planning, Sealift Research, and Technology development and program guidance. Conducted Sealift ship concept development and analysis. ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A					
Title: Lighter/HSV Seabase to Shore Cargo Transfer ***Articles:*** ***FY 2016 Accomplishments:*** N/A ***FY 2017 Plans:*** FY17 - Continued development and demonstration of at-sea vehicle transfer capability. ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A	0.000 -	1.000 -	0.000 -	0.000 -	0.000 -
Accomplishments/Planned Programs Subtotals	0.000	4.211	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• NDSF/0900 (3116): *Strategic Sealift Research and Development*	5.502	0.000	6.425	-	6.425	6.354	6.025	6.151	6.276	0.000	90.062

Remarks

D. Acquisition Strategy

Not applicable for SEALIFT R&D efforts.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3376 / *Strategic Sealift*

E. Performance Metrics

Annual Program Review.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy												Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603564N *I Ship Prel Design & Feasibility Studies*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	46.576	3.213	15.805	12.012	-	12.012	18.990	17.976	10.842	10.132	Continuing	Continuing
0409: *DDG-51 Flt III Concept Development*	43.776	2.246	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	46.022
3261: *TAGOS Design & Total Ship Integration*	0.000	0.000	0.000	12.012	-	12.012	18.590	17.576	10.842	10.132	Continuing	Continuing
3377: *T-ATS Ship Concept Development*	2.800	0.967	0.962	0.000	-	0.000	0.400	0.400	0.000	0.000	0.000	5.529
3389: *OPLOG IPT Development*	0.000	0.000	14.843	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	14.843
Program MDAP/MAIS Code: **Project MDAP/MAIS Code(s):** 180												

A. Mission Description and Budget Item Justification

0409 - DDG 51 FLT III Concept Development - Develop Preliminary Analysis, Testing, and Design for introduction of DDG 51 FLT III.

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).

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. RDT&E funding will provide for trade studies and program support leading to award of a Detail Design and Construction contract in FY17.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603564N *I Ship Prel Design & Feasibility Studies*

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) 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	3.332	15.805	11.645	-	11.645
Current President's Budget	3.213	15.805	12.012	-	12.012
Total Adjustments	-0.119	0.000	0.367	-	0.367
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.119	0.000			
• Program Adjustments	0.000	0.000	11.944	-	11.944
• Rate/Misc Adjustments	0.000	0.000	-11.577	-	-11.577

Change Summary Explanation

FY18 increased $+11.944 million for T-AGOS replacement design, $-11.729 million for appropriation transfer to NDSF (National Defense Sealift Fund) and $ +0.152 million for rate/miscellaneous adjustments.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603564N / *Ship Prel Design & Feasibility Studies*	Project (Number/Name) 0409 / *DDG-51 Flt III Concept Development*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0409: *DDG-51 Flt III Concept Development*	43.776	2.246	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	46.022
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 180

A. Mission Description and Budget Item Justification

DDG 51 FLT III Concept Development study - Funding provided to evaluate design options associated with FLT III cost and feasibility. The concepts were variants of the DDG 51 Flight IIA design and included incorporation of SPY-6 (AMDR).

DDG 51 FLT III Preliminary Design - Funding provided for preliminary design efforts associated with introduction of Flight III in FY16. Efforts included Finite Element Analysis (FEA) of the Deckhouse Structure, Electromagnetic Signatures, Electromagnetic Interference (EMI), Electromagnetic Pulse (EMP), and Radiation Hazard Analysis, Electrical Power capability increase and Distribution System analysis, Cooling Systems analysis, Topside Signature analysis, and Weight and Stability analysis.

DDG 51 FLT III Contract Design - Funding provided to develop contract drawings and specifications for the Detail Design and Construction contracts.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Proj:0409 DDG-51 Flt III Concept Development	2.246	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Contract drawings updated to include SPY-6 government furnished information (GFI) and HES-C A/C Plant vendor furnished information updates.					
FY 2017 Plans: N/A					
FY 2018 Base Plans: N/A					
FY 2018 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	2.246	0.000	0.000	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603564N / *Ship Prel Design & Feasibility Studies*	**Project (Number/Name)** 0409 / *DDG-51 Flt III Concept Development*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• SCN/2122: *DDG 51 Class*	4,207.664	3,660.251	3,640.792	-	3,640.792	3,819.964	3,731.008	3,392.011	3,448.012	3,834.720	102,786.832
• SCN/5300: *Completion of PY Shipbuilding Programs (DDG 51)*	0.000	15.959	51.377	-	51.377	53.966	61.011	0.000	0.000	0.000	182.313

Remarks

D. Acquisition Strategy

DDG 51 FLT III concept development produced contract level technical detail in support of the award of a Flight III ECP. The DDG 51 Acquisition Strategy reflects the competitive award of the FY13-17 Multi-Year Procurement in a Flight IIA configuration, and supports Flight III upgrades beginning with one of the FY16 ships.

E. Performance Metrics

None

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603564N / *Ship Prel Design & Feasibility Studies*	Project (Number/Name) 0409 / *DDG-51 Flt III Concept Development*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
DDG 51 FLT III Concept Study	WR	NSWC : Dahlgren, VA	2.920	0.000		0.000		0.000		-		0.000	0.000	2.920	-
DDG 51 FLT III Concept Study	WR	NSWC : Carderock, MD	3.076	0.000		0.000		0.000		-		0.000	0.000	3.076	-
DDG 51 FLT III Concept Study	WR	SPAWAR : Charleston, SC	0.285	0.000		0.000		0.000		-		0.000	0.000	0.285	-
DDG 51 FLT III Concept Study	FFRDC	JHU : Baltimore, MD	1.447	0.000		0.000		0.000		-		0.000	0.000	1.447	-
DDG 51 FLT III Concept Study	MIPR	CPSD : Columbia, SC	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
DDG 51 FLT III Concept Study	C/CPAF	BIW : Bath, ME	0.376	0.000		0.000		0.000		-		0.000	0.000	0.376	-
DDG 51 FLT III Concept Study	WR	NRL : Washington, DC	0.164	0.000		0.000		0.000		-		0.000	0.000	0.164	-
DDG 51 FLT III Concept Study	C/CPAF	Ingalls : Pascagoula, MS	0.214	0.000		0.000		0.000		-		0.000	0.000	0.214	-
DDG 51 FLT III Concept Study	C/CPAF	Seaport : Washington, DC	4.819	0.000		0.000		0.000		-		0.000	0.000	4.819	-
DDG 51 FLT III Concept Study	MIPR	DTIC : Ft. Belvoir, VA	0.002	0.000		0.000		0.000		-		0.000	0.000	0.002	-
DDG 51 FLT III Concept Study	Various	Various : Washington, DC	1.653	0.000		0.000		0.000		-		0.000	0.000	1.653	-
DDG 51 FLT III Concept Study	WR	SPAWAR : San Diego, CA	0.244	0.000		0.000		0.000		-		0.000	0.000	0.244	-
DDG 51 FLT III Concept Study	WR	NAWC : Pax River, MD	0.025	0.000		0.000		0.000		-		0.000	0.000	0.025	-
DDG 51 FLT III Preliminary Design	WR	NSWC : Carderock, MD	5.373	0.000		0.000		0.000		-		0.000	0.000	5.373	-
DDG 51 FLT III Preliminary Design	C/CPAF	Seaport : Washington, DC	6.675	0.000		0.000		0.000		-		0.000	0.000	6.675	-
DDG 51 FLT III Preliminary Design	WR	NSWC : Dahlgren, VA	2.281	0.000		0.000		0.000		-		0.000	0.000	2.281	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603564N / *Ship Prel Design & Feasibility Studies*	**Project (Number/Name)** 0409 / *DDG-51 Flt III Concept Development*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
DDG 51 FLT III Preliminary Design	C/CPAF	BIW : Bath, ME	0.630	0.000		0.000		0.000		-		0.000	0.000	0.630	-
DDG 51 FLT III Preliminary Design	C/CPAF	Ingalls : Pascagoula, MS	0.630	0.000		0.000		0.000		-		0.000	0.000	0.630	-
DDG 51 FLT III Contract Design	C/FFP	YORK : York, PA	3.093	1.726	Mar 2016	0.000		0.000		-		0.000	0.000	4.819	-
DDG 51 FLT III Contract Design	WR	NSWC : Carderock, MD	2.094	0.520	Dec 2015	0.000		0.000		-		0.000	0.000	2.614	-
DDG 51 FLT III Contract Design	C/CPAF	Ingalls : Pascagoula, MS	0.205	0.000		0.000		0.000		-		0.000	0.000	0.205	-
DDG 51 FLT III Contract Design	C/CPAF	Seaport : Washington, DC	7.570	0.000		0.000		0.000		-		0.000	0.000	7.570	-
		Subtotal	43.776	2.246		0.000		0.000		-		0.000	0.000	46.022	-

	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	43.776	2.246		0.000		0.000		-		0.000	0.000	46.022	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603564N / *Ship Prel Design & Feasibility Studies*	**Project (Number/Name)** 0409 / *DDG-51 Flt III Concept Development*

	FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022			
	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 0409																												
DDG-51 FLIGHT III CONCEPT DEVELOPMENT: DDG 51 FLT III Contract Design																												

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603564N / *Ship Prel Design & Feasibility Studies*	**Project (Number/Name)** 0409 / *DDG-51 Flt III Concept Development*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 0409				
DDG-51 FLIGHT III CONCEPT DEVELOPMENT: DDG 51 FLT III Contract Design	1	2016	4	2016

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603564N / *Ship Prel Design & Feasibility Studies*	Project (Number/Name) 3261 / *TAGOS Design & Total Ship Integration*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3261: *TAGOS Design & Total Ship Integration*	0.000	0.000	0.000	12.012	-	12.012	18.590	17.576	10.842	10.132	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: T-AGOS Design & Total Ship Integration	0.000	0.000	12.012	0.000	12.012
Articles:	-	-	-	-	-
FY 2016 Accomplishments: N/A					
FY 2017 Plans: N/A					
FY 2018 Base Plans: Complete Analysis of Alternatives and obtain approval of preferred alternative at Gate 2. Draft, complete Navy staffing, and conduct Gate 3a to obtain approval for the Capability Development Document (CDD). Develop an Indicative Design based on the CDD requirements to validate the CDD content and budget. Draft and obtain approvals for early acquisition documents and start Preliminary Design. Coordinate acquisition efforts with NAVSEA, MSC, PEO SHIPS, CNO, ASN RD&A, OSD, and Fleet.					
FY 2018 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	0.000	0.000	12.012	0.000	12.012

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603564N / *Ship Prel Design & Feasibility Studies*	**Project (Number/Name)** 3261 / *TAGOS Design & Total Ship Integration*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 5030: *T-AGOS SURTASS Ships*	0.000	0.000	0.000	-	0.000	0.000	0.000	0.000	355.000	1,218.500	1,573.500

Remarks

D. Acquisition Strategy

Conduct a full and open competition based on a Navy design with award to a single shipbuilder for Detail Design and Construction (DD&C) of a Lead Hull with options for Follow-On Ships.

E. Performance Metrics

None.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603564N / *Ship Prel Design & Feasibility Studies*	**Project (Number/Name)** 3261 / *TAGOS Design & Total Ship Integration*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering Support	Various	Various : Various	0.000	0.000		0.000		6.775	Jan 2018	-		6.775	31.950	38.725	-
Industry Studies	C/FFP	Various : Various	0.000	0.000		0.000		2.078	Jun 2018	-		2.078	3.000	5.078	-
Model Testing	Various	Various : Various	0.000	0.000		0.000		1.543	Jun 2018	-		1.543	5.653	7.196	-
		Subtotal	0.000	0.000		0.000		10.396		-		10.396	40.603	50.999	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Milestone Documentation Support	Various	Various : Various	0.000	0.000		0.000		1.116	Jan 2018	-		1.116	3.297	4.413	-
RFP and Specification Development	Various	Various : Various	0.000	0.000		0.000		0.000		-		0.000	9.965	9.965	-
Test and Evaluation Planning	Various	Various : Various	0.000	0.000		0.000		0.500	Jan 2018	-		0.500	2.275	2.775	-
Source Selection Support	Various	Various : Various	0.000	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		1.616		-		1.616	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		0.000		12.012		-		12.012	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603564N / *Ship Prel Design & Feasibility Studies*	**Project (Number/Name)** 3261 / *TAGOS Design & Total Ship Integration*

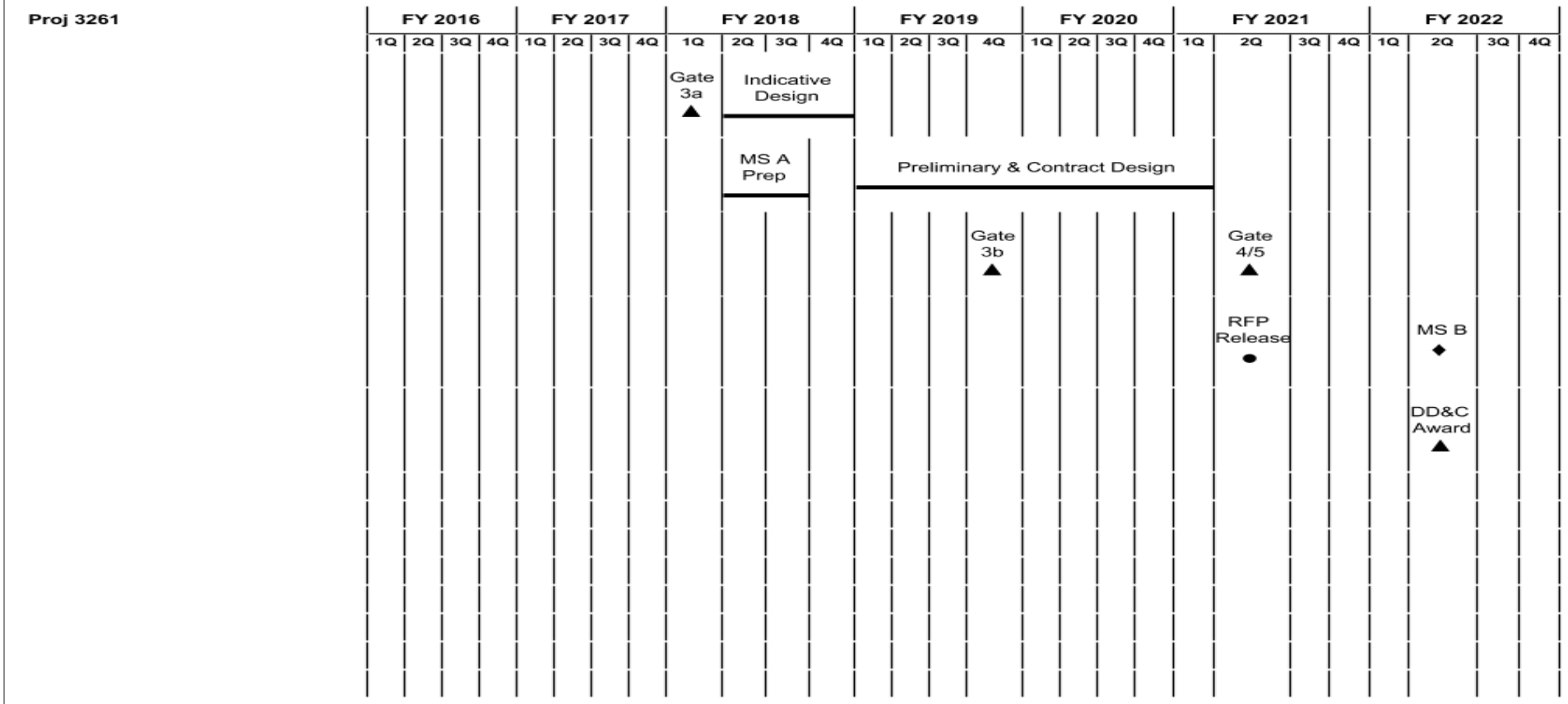

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603564N / *Ship Prel Design & Feasibility Studies*	**Project (Number/Name)** 3261 / *TAGOS Design & Total Ship Integration*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3261				
Gate 3a	1	2018	1	2018
Indicative Design	2	2018	4	2018
Milestone A Doc Prep	2	2018	3	2018
Preliminary and Contract Design	1	2019	1	2021
Gate 3b	4	2019	4	2019
Gate 4/5	2	2021	2	2021
RFP Release	2	2021	2	2021
Milestone B	2	2022	2	2022
DD&C Award	2	2022	2	2022

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603564N / *Ship Prel Design & Feasibility Studies*	Project (Number/Name) 3377 / *T-ATS Ship Concept Development*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3377: *T-ATS Ship Concept Development*	2.800	0.967	0.962	0.000	-	0.000	0.400	0.400	0.000	0.000	0.000	5.529
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.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Ship Concept Development	0.967	0.962	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: Ship Concept Development for future tug, salvage, and rescue mission capabilities. ***FY 2016 Accomplishments:*** Completed source selection, awarded four competitive Industry Studies, design contracts. Coordinated efforts with NAVSEA, MSC, PEO Ships, CNO, ASN RD&A, OSD and Fleet. ***FY 2017 Plans:*** Issue Request for Proposal (RFP), conduct source selection, and award contract for Detail Design and Construction (DD&C) of the Lead Hull. Coordinate Acquisition efforts with NAVSEA, MSC, PEO Ships, CNO, ASN RD&A, OSD and Fleet. ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.967	0.962	0.000	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603564N / *Ship Prel Design & Feasibility Studies*	**Project (Number/Name)** 3377 / *T-ATS Ship Concept Development*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 5035: *Towing, Salvage and Rescue Ship (T-ATS)*	75.000	0.000	76.204	-	76.204	77.517	79.083	75.339	76.017	186.865	646.025

Remarks

D. Acquisition Strategy

Lead Hull contract will be awarded in FY17.

E. Performance Metrics

None.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603564N / *Ship Prel Design & Feasibility Studies*	Project (Number/Name) 3389 / *OPLOG IPT Development*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3389: *OPLOG IPT Development*	0.000	0.000	14.843	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	14.843
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Prior to FY2017, Project 3389 was funded in PE 0408042N, National Defense Sealift Fund (NDSF) under Project 3117 Naval Operational Logistics (OPLOG) Integration. This project is not a new start. For FY2018 and follow, Project 3389 funding is transferred back to PE 0408042N NDSF Project 3117.

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.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Advanced Systems	0.000	1.943	0.000	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603564N / *Ship Prel Design & Feasibility Studies*	**Project (Number/Name)** 3389 / *OPLOG IPT Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Articles:	-	-	-	-	-
FY 2016 Accomplishments: N/A ***FY 2017 Plans:*** Continue land-based testing for prototype E-STREAM fueling (FAS)station. Complete design of hybrid STREAM system for legacy CLF ships. Identify market driven changes to COTS components and impacts on system integration. ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A					
Title: Logistics Architectures	0.000	0.050	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2016 Accomplishments: N/A ***FY 2017 Plans:*** Conduct combat logistics force data collection and operational studies. ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A					
Title: Shipboard Energy Conservation (E-STREAM)	0.000	6.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2016 Accomplishments: N/A ***FY 2017 Plans:***					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603564N / *Ship Prel Design & Feasibility Studies*	**Project (Number/Name)** 3389 / *OPLOG IPT Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Continue energy management approach improvements including energy efficient ESTREAM system and components. Data package development and prototype purchase, installations, and testing for energy initiatives including efficient shipboard replenishment at sea (RAS) ESTREAM planned for FY 2017. ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A					
Title: Shipboard Energy Conservation (Other) ***Articles:*** ***FY 2016 Accomplishments:*** N/A ***FY 2017 Plans:*** 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. ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A	0.000 -	6.850 -	0.000 -	0.000 -	0.000 -
Accomplishments/Planned Programs Subtotals	0.000	14.843	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• NDSF/0408042N/3117: *3117/Naval Operational Logistics Integration*	17.927	0.000	11.729	-	11.729	8.982	9.172	9.375	9.533	0.000	66.718

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603564N / *Ship Prel Design & Feasibility Studies*	**Project (Number/Name)** 3389 / *OPLOG IPT Development*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost

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

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603570N *I Advanced Nuclear Power Systems*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	0.000	482.040	453.313	329.500	-	329.500	256.146	181.656	149.191	130.629	Continuing	Continuing
1258: *Nuclear Technology Development*	0.000	62.767	62.987	64.038	-	64.038	66.039	67.646	69.103	70.485	Continuing	Continuing
3219: *SBSD Nuclear Technology Development*	0.000	419.273	390.326	265.462	-	265.462	190.107	114.010	80.088	60.144	Continuing	Continuing

Program MDAP/MAIS Code:
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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	482.040	453.313	453.317	-	453.317
Current President's Budget	482.040	453.313	329.500	-	329.500
Total Adjustments	0.000	0.000	-123.817	-	-123.817
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Program Adjustments	0.000	0.000	-124.847	-	-124.847
• Rate/Misc Adjustments	0.000	0.000	1.030	-	1.030

Change Summary Explanation

Technical: Not applicable.
Schedule: Not applicable.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603570N / *Advanced Nuclear Power Systems*	Project (Number/Name) 1258 / *Nuclear Technology Development*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
1258: *Nuclear Technology Development*	0.000	62.767	62.987	64.038	-	64.038	66.039	67.646	69.103	70.485	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: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319 / 4					R-1 Program Element (Number/Name) PE 0603570N / *Advanced Nuclear Power Systems*				Project (Number/Name) 3219 / *SBSD Nuclear Technology Development*			
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
3219: *SBSD Nuclear Technology Development*	0.000	419.273	390.326	265.462	-	265.462	190.107	114.010	80.088	60.144	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: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603573N *I Advanced Surface Machinery Sys*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	172.243	23.443	36.655	29.953	-	29.953	22.596	21.546	21.074	21.490	Continuing	Continuing
2471: *Integrated Power Systems (IPS)*	172.243	23.443	36.655	29.953	-	29.953	22.596	21.546	21.074	21.490	Continuing	Continuing

A. Mission Description and Budget Item Justification

This 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.

B. Program Change Summary ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**
Previous President's Budget	24.143	36.655	30.114	-	30.114
Current President's Budget	23.443	36.655	29.953	-	29.953
Total Adjustments	-0.700	0.000	-0.161	-	-0.161
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.700	0.000			
• Program Adjustments	0.000	0.000	-0.123	-	-0.123
• Rate/Misc Adjustments	0.000	0.000	-0.038	-	-0.038

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603573N *I Advanced Surface Machinery Sys*

Change Summary Explanation

FY 2016 funding request reflects a reduction of $0.700 million to account for SBIR/STTR Transfer.

FY 2018 funding request reflects a reduction of $0.161 million to account for program adjustments of (-$0.123 million), and (-$0.38 million) for other rate / miscellaneous adjustments.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603573N / *Advanced Surface Machinery Sys*	Project (Number/Name) 2471 / *Integrated Power Systems (IPS)*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2471: *Integrated Power Systems (IPS)*	172.243	23.443	36.655	29.953	-	29.953	22.596	21.546	21.074	21.490	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 DDG1000 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.

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.

Power and Energy Systems combines previously shown Energy Efficiency and Mission Power R2A Accomplishments and Plans to reflect the focus on providing power and energy solutions for warfighting capability. Energy efficiency is but one of several requirements levied upon these systems and the distinction between mission power and energy efficiency is very difficult to divide out. 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Power and Energy Systems	22.011	19.399	16.024	0.000	16.024

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603573N / *Advanced Surface Machinery Sys*	**Project (Number/Name)** 2471 / *Integrated Power Systems (IPS)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Articles:	-	-	-	-	-

FY 2016 Accomplishments:

Continued material procurement for the DDG51 Flight III 4.2MW AG9160RF Gas Turbine Generator (GTG) and commenced manufacture of AG9160RF GTG. Continued Test Planning. Prepared Test Plans and Procedures.

Continued planning for future gas turbine operational readiness and fuel efficiency upgrades.

Completed Production Readiness Review and exercised contract options to Manufacture two (2) DDG51 Flight III Air and Missile Defense Radar (AMDR) Power Conversion Modules (PCM) Low Rate Initial Production (LRIP) units. LRIP units will support DDG51 Flight III AMDR Developmental Testing (DT) at the Surface Combat System Center (SCSC) Wallops Island, VA. Commenced Factory Acceptance Test. Continued planning for DDG51 Flight III AMDR PCM LRIP Factory Acceptance Test (FAT) and Environmental Qualification Tests (EQT). Continued planning and commence site modifications for the Power Hardware in the Loop (PHIL) testing at Florida State University Center for Advanced Power Systems (FSU CAPS). Continued planning for electrical system validation testing at the NSWC Philadelphia, PA land based test site, and continued to support the ship building program office planning for PCM / AMDR combat system integration testing in support of AMDR Developmental Testing (DT) at Wallops Island, VA.

Continued developing the concept of a modular, scalable intermediate power and energy system made of common building blocks to support multiple mission systems on various ships. This concept is known as Energy Magazine (EM). The EM can be utilized in back fit and forward fit applications with existing ship power systems and is expected to incorporate building blocks common with the Energy Storage Module (ESM) prototype and ESM Stable Backup Power (SBP). Continued EM performance specification development and acquisition approach.

Completed design and begin manufacture of ESM prototype for mission system support. Prepared test plans and procedures for Factory Acceptance Testing (FAT) of ESM prototype. Continued qualification of ESM prototype battery sub-system in preparation for testing. Prepared Test Plans and Procedures for ESM prototype land based testing at Florida State University Center for Advanced Power Systems (FSU CAPS). (Note: ESM prototype will be tested at FSU CAPS and results will be exchanged with the United Kingdom (UK) Ministry of

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603573N / *Advanced Surface Machinery Sys*	**Project (Number/Name)** 2471 / *Integrated Power Systems (IPS)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Defence (MOD) via the Advanced Electrical Power and Propulsion Project (AEP3) Project Arrangement and the Coalition Warfare Program (CWP) Directed Energy Power Systems (DEPS) project.)					
FY 2017 Plans: Complete manufacture of the DDG51 Flight III 4.2MW AG9160RF Gas Turbine Generator (GTG), conduct Factory Acceptance Testing (FAT), and prepare for delivery to DDG51 Flight III electrical integration testing at the Naval Surface Warfare Center (NSWC) - Philadelphia, PA. Continue planning for future gas turbine operational readiness and fuel efficiency upgrades. Conduct Test Readiness Review, Factory Acceptance Test (FAT) and Environmental Qualification Test (EQT) on DDG51 Flight III Air and Missile Defense Radar (AMDR) Power Conversion Modules (PCM) Low Rate Initial Production (LRIP) units. Conduct Power Hardware in the Loop (PHIL) testing at FSU CAPS. Continue to support the ship building program office planning for PCM / AMDR combat system integration testing in support of AMDR Developmental Testing (DT) at Wallops Island, VA, and planning for electrical system validation testing at the NSWC Philadelphia, PA land based test site. Following successful completion of FAT, EQT, and PHIL testing, prepare LRIP units for delivery to DDG51 Flight III AMDR Developmental Testing (DT) at the Surface Combat System Center (SCSC) Wallops Island, VA. Validate mission system power interfaces within existing ship designs with ESM prototype testing. Begin preparation for simulations of advanced power system architectures for fully integrated power and energy systems (IPES) for potential future surface combatants. Begin developing specifications and acquisition documentation in order to demonstrate at full scale a modular, scalable Energy Magazine to be incorporated into existing platform designs and satisfying the needs of multiple mission systems ready for ship installations. Complete Factory Acceptance Testing (FAT) and deliver ESM prototype to FSU CAPS. Complete Test Plans and Procedures and begin Controller Hardware In the Loop (CHIL) testing in preparation for Power Hardware In the Loop (PHIL) testing. Continue design of ESM SBP system. (Note: 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 Coalition Warfare Program (CWP) Directed Energy Power Systems (DEPS) project.)					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603573N / *Advanced Surface Machinery Sys*	**Project (Number/Name)** 2471 / *Integrated Power Systems (IPS)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Conduct feasibility studies, Cost Based Assessments, and begin developing technical and performance specifications for a power dense Advanced Power Generation Module (APGM) in support of Future Surface Combatant power generation requirements. APGM gas turbine powered generator sets may have superior fuel savings over predecessor units. Continue to refine IPES notional architectures through studies and industry engagement.					
FY 2018 Base Plans: 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. Deliver Air and Missile Defense Radar (AMDR) Power Conversion Modules (PCM) units to the Surface Combat System Center (SCSC) Wallops Island, VA for DDG51 Flight III AMDR Developmental Testing (DT). 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 VAC distribution systems to 1000 VDC to support the AMDR on DDG 51 Flight III Class Ships. Continue planning for future gas turbine operational readiness and fuel efficiency upgrades. 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 low-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.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603573N / *Advanced Surface Machinery Sys*	**Project (Number/Name)** 2471 / *Integrated Power Systems (IPS)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 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.) Conduct PHIL testing of 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. 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. 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. Continue to refine real time simulation model of various ship classes at FSU CAPS 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). Complete data analysis and issue reports for testing completed.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603573N / *Advanced Surface Machinery Sys*	**Project (Number/Name)** 2471 / *Integrated Power Systems (IPS)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Complete planning for FY 19 simulated electrical system integration testing using real time power hardware in the loop at the Center for Advanced Power System at Florida State University. Develop performance specification for next generation compact high power Advanced Power Generation Module (APGM). Develop computer component models and commence system level modeling and simulation efforts. Conduct feasibility studies, Cost Based Assessments, and begin developing performance and technical specifications. ***FY 2018 OCO Plans:*** N/A					
Title: Naval Power Technology Development / Platform Integration & Transition	1.432	1.104	1.104	0.000	1.104
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Continued to execute the Advanced Electric Power and Propulsion Project, Project Arrangement (short title AEP3 PA or 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. Commenced execution of PA complimentary effort (Directed Energy Power Systems (DEPS)) under the Coalition Warfare Program (CWP). Continued to develop power and propulsion system configurations in support of future surface ship acquisition programs. Developed alternative power and propulsion solutions for future surface combatants and amphibious ships. Continued 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. Continued to analyze alternatives for supplying power to advanced radars, combat systems, and electric weapons power demands and potential interfaces to develop optimum alternative solutions. Continued assessments of Naval Power and Energy System alternate architectures to best meet emerging ship requirements. Completed biennial update of the Naval Power and Energy Systems Technology Development Roadmap (TDR).					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603573N / *Advanced Surface Machinery Sys*	**Project (Number/Name)** 2471 / *Integrated Power Systems (IPS)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Continued to support maturation and transition of ONR Future Naval Capabilities (FNC) products to meet TDR identified gaps. Continued Combat Power and Energy System Overarching Integrated Product Team (OIPT). Continued to generate strategy, technology development plan and resource requirements for future surface combatant integrated power and energy system. ***FY 2017 Plans:*** Continue to execute the Advanced Electric Power and Propulsion Project, Project Arrangement (short title AEP3 PA or 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. Continued execution of PA complimentary effort (Directed Energy Power Systems (DEPS)) under the Coalition Warfare Program (CWP). 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. Commence biennial update of the Naval Power and Energy Systems Technology Development Roadmap. Support maturation and transition of ONR Future Naval Capabilities (FNC) products to meet TDR identified gaps. Continue to support maturation and transition of ONR Future Naval Capabilities (FNC) products to meet TDR identified gaps. Continue Combat Power and Energy System Overarching Integrated Product Team (OIPT).					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603573N / *Advanced Surface Machinery Sys*	**Project (Number/Name)** 2471 / *Integrated Power Systems (IPS)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Continue to generate strategy, technology development plan and resource requirements for future surface combatant integrated power and energy system.					
FY 2018 Base Plans: Continue to execute the Advanced Electric Power and Propulsion Project, Project Arrangement (short title AEP3 PA or 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). 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. Complete biennial update of the Naval Power and Energy Systems Technology Development Roadmap. Support maturation and transition of ONR Future Naval Capabilities (FNC) products to meet TDR identified gaps. Continue to support maturation and transition of ONR Future Naval Capabilities (FNC) products to meet TDR identified gaps. Continue Combat Power and Energy System Overarching Integrated Product Team (OIPT). Continue to generate strategy, technology development plan and resource requirements for future surface combatant integrated power and energy system.					
FY 2018 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A					
Title: Cybersecurity Boundary Defense Capability	0.000	16.152	12.825	0.000	12.825
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Not Applicable					
FY 2017 Plans: Conduct the following studies: cybersecurity assessment of DDG 51 and CG 47 ship class Hull, Mechanical and Electrical (HM&E) systems; analysis of inter-enclave interfaces; enhanced firewall application analysis; and, Boundary Defense Capability. Plan for future studies on intra-HM&E enclave controls point, HM&E cyber situational awareness tools, message authentication, intrusion detection system, Host level protection, and intrusion prevention systems.					
FY 2018 Base Plans: 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					
FY 2018 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	23.443	36.655	29.953	0.000	29.953

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603573N / *Advanced Surface Machinery Sys*	**Project (Number/Name)** 2471 / *Integrated Power Systems (IPS)*

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 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: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603573N / *Advanced Surface Machinery Sys*	**Project (Number/Name)** 2471 / *Integrated Power Systems (IPS)*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	SS/FFP	Rolls Royce : Walpole, MA	24.851	8.155	Nov 2015	4.822	Oct 2016	2.000	Oct 2017	-		2.000	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	33.168	7.509	Oct 2015	7.700	Oct 2016	2.500	Oct 2017	-		2.500	Continuing	Continuing	Continuing
Product Development	C/CPFF	Various : Various	34.806	3.418	Oct 2015	3.121	Oct 2016	6.850	Oct 2017	-		6.850	Continuing	Continuing	Continuing
Product Development	WR	NSWCCD-SSES : Phila, PA	48.596	3.531	Oct 2015	4.060	Oct 2016	4.978	Oct 2017	-		4.978	Continuing	Continuing	Continuing
Cybersecurity BDC	WR	NSWCCD-SSES : Phila, PA	0.000	0.000		9.152	Feb 2017	7.075	Nov 2017	-		7.075	Continuing	Continuing	Continuing
Cybersecurity BDC	WR	NSWCDD : Dahlgren, VA	0.000	0.000		2.000	Dec 2016	0.000		-		0.000	Continuing	Continuing	Continuing
Cybersecurity BDC	C/CPIF	Boeing : Huntington Beach, CA	0.000	0.000		2.500	Mar 2017	1.000	Jan 2018	-		1.000	Continuing	Continuing	Continuing
Cybersecurity BDC	C/FP	Various HM&E Equipment Vendors : Various	0.000	0.000		2.000	Feb 2017	4.500	Feb 2018	-		4.500	Continuing	Continuing	Continuing
Cybersecurity BDC	C/CPIF	Various : Various	0.000	0.000		0.500	Feb 2017	0.250	Feb 2018	-		0.250	Continuing	Continuing	Continuing
		Subtotal	144.981	22.613		35.855		29.153		-		29.153	-	-	-

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 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	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603573N / *Advanced Surface Machinery Sys*	**Project (Number/Name)** 2471 / *Integrated Power Systems (IPS)*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Management	C/CPFF	Herren Associates : Alexandria, VA	2.308	0.830	Oct 2015	0.800	Oct 2016	0.800	Oct 2017	-		0.800	Continuing	Continuing	Continuing
		Subtotal	2.308	0.830		0.800		0.800		-		0.800	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	172.243	23.443		36.655		29.953		-		29.953	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603573N / *Advanced Surface Machinery Sys*	**Project (Number/Name)** 2471 / *Integrated Power Systems (IPS)*

PE 0603573N

Electric Ships Office PMS 320 Directing the Future of Ships Power

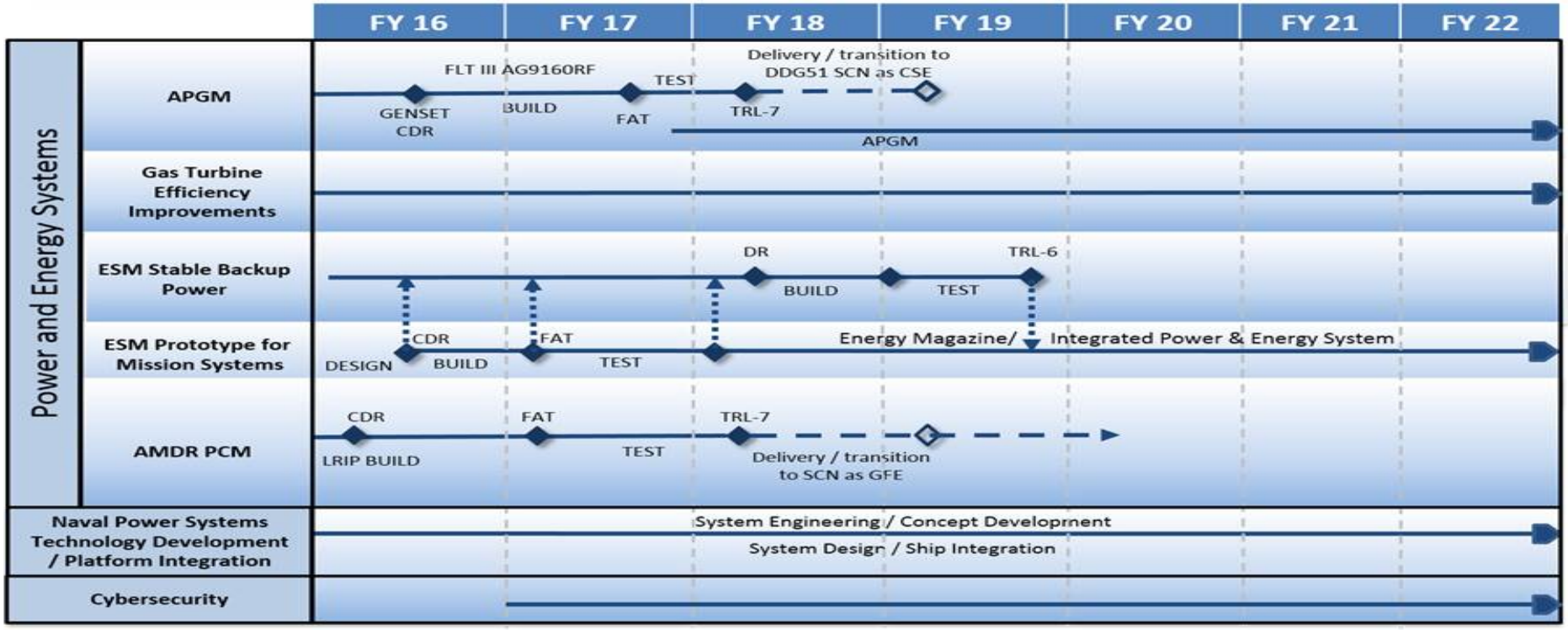

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Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603573N / *Advanced Surface Machinery Sys*	**Project (Number/Name)** 2471 / *Integrated Power Systems (IPS)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2471				
Power and Energy Systems	1	2016	4	2022
Naval Power Technology Development / Platforms Integration & transition	1	2016	4	2022
Cybersecurity BDC	1	2017	4	2021

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603576N *I (U)CHALK EAGLE*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	0.000	493.472	367.016	191.610	-	191.610	30.713	54.863	62.041	73.867	Continuing	Continuing
1578: *Chalk Eagle*	0.000	493.472	367.016	191.610	-	191.610	30.713	54.863	62.041	73.867	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	511.651	367.016	127.270	-	127.270
Current President's Budget	493.472	367.016	191.610	-	191.610
Total Adjustments	-18.179	0.000	64.340	-	64.340
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-18.179	0.000			
• Program Adjustments	0.000	0.000	53.127	-	53.127
• Rate/Misc Adjustments	0.000	0.000	11.213	-	11.213

Change Summary Explanation

Technical: Not applicable.

Schedule: Not applicable.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy												Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603581N *I (U)LITTORAL COMBAT SHIP*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	1,193.126	109.426	51.630	40.991	-	40.991	34.428	10.970	6.518	0.986	Continuing	Continuing
3096: *Littoral Combat Ship*	1,193.126	86.858	28.906	20.841	-	20.841	16.140	9.997	5.537	0.000	0.000	1,361.405
4506: *LCS Training*	0.000	8.085	22.724	20.150	-	20.150	18.288	0.973	0.981	0.986	Continuing	Continuing
9999: *Congressional Adds*	0.000	14.483	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	14.483
Program MDAP/MAIS Code: **Project MDAP/MAIS Code(s):** 374												

A. Mission Description and Budget Item Justification

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, and 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.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	91.416	51.630	40.844	-	40.844
Current President's Budget	109.426	51.630	40.991	-	40.991
Total Adjustments	18.010	0.000	0.147	-	0.147
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	0.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	10.000	0.000			
• SBIR/STTR Transfer	-1.990	0.000			
• Program Adjustments	0.000	0.000	-0.201	-	-0.201
• Rate/Misc Adjustments	0.000	0.000	0.348	-	0.348

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603581N *I (U)LITTORAL COMBAT SHIP*

• Congressional Directed Reductions	10.000	-	-	-	-
Adjustments					

Congressional Add Details ($ in Millions, and Includes General Reductions)

	FY 2016	FY 2017
Project: 9999: *Congressional Adds*		
Congressional Add: *LCS Training Courseware*	14.483	0.000
Congressional Add Subtotals for Project: 9999	14.483	0.000
Congressional Add Totals for all Projects	14.483	0.000

Change Summary Explanation

In FY16, $20.0M was added to Project 3096 for Condition Based Maintenance ($10M) and Frigate Continuing Resolution ($10M). $1.99M was reduced for SBIR ($1.35M for Project 3096, $0.122M in Project 4506 and $0.517M in Project 2736 Congressional Adds).

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603581N / *(U)LITTORAL COMBAT SHIP*	Project (Number/Name) 3096 / *Littoral Combat Ship*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3096: *Littoral Combat Ship*	1,193.126	86.858	28.906	20.841	-	20.841	16.140	9.997	5.537	0.000	0.000	1,361.405
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 is comprised of 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 is also comprised of 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: LCS System-of-Systems Development, Engineering & Experimentation	16.354	17.997	15.209	0.000	15.209
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: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603581N / *(U)LITTORAL COMBAT SHIP*	**Project (Number/Name)** 3096 / *Littoral Combat Ship*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
FY 2016 Accomplishments: Flight 0+ and FY10 Block Buy Baselines: Provided systems engineering support for FSST preparation, execution, and partial repair efforts on LCS 5 and LCS 6. Provided systems engineering support for TSST, and post-event analysis and engineering for Seaframe and SUW MP DT and Phase II IOT&E on LCS 4. Provided systems engineering support for Seaframe and MCM MP IOT&E on LCS 2. Provided systems engineering for Air Defense test planning for Self Defense Test Ship testing in support of PRA on the IND Variant. Initiated design and fabrication of an INDEPENDENCE variant full ship model in support of testing the hull form for maximum structural loads. Provided systems engineering support to develop conceptual designs of lethality and survivability upgrades for both variants of LCS. Provided Seaframe and Mission Systems engineering support to investigate, design, and develop technical solutions for design scope on both Freedom and Independence Class Ships. Provided Seaframe and Mission Systems engineering support to certify equipment to include oversight of design changes required for any re-certification. Updated technical and performance baseline for future ship procurements based on systems design and testing execution. Continued conducting studies in support of development of future technical and performance baseline design upgrades.					
FY 2017 Plans: Flight 0+ and FY10 Block Buy Baselines: Provide systems engineering support for Seaframe DT on LCS 5 and LCS 6. Complete post-FSST analysis and implement changes based on findings. Provide systems engineering support for Seaframe and ASW MP DT on the Freedom Variant. Provide systems engineering support for Seaframe and SUW MP Incr 3 DT, TECHEVAL, and OT on the Freedom variant. Provide systems engineering support for Air Defense test planning and execution on the Self Defense Test Ship in support of PRA on the IND Variant. Provide systems engineering support for Air Defense test planning on the Self Defense Test Ship in support of PRA on the FRE Variant. Conduct VTUAV Dynamic Interface testing on the Freedom and Independence Variants. Execute tank test of the INDEPENDENCE full ship model. Provide systems engineering support for planning of Calm Water Trials 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 Class Ships. 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					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603581N / *(U)LITTORAL COMBAT SHIP*	**Project (Number/Name)** 3096 / *Littoral Combat Ship*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
design and testing execution. Continue conducting studies in support of development of future technical and performance baseline design upgrades. ***FY 2018 Base Plans:*** 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 PRA on the Freedom variant. Conduct analyses to qualify a lower cost, lighter weight thermal insulation on the Independence variant. Complete VTUAV Dynamic Interface testing on the Freedom and Independence Variants. Provide Seaframe and Mission Systems engineering support to investigate, design, and develop technical solutions for design scope on both Freedom and Independence Class Ships. 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. ***FY 2018 OCO Plans:*** N/A					
Title: LCS Test & Evaluation	50.504	10.909	5.632	0.000	5.632
Articles:	-	-	-	-	-
Description: Execute formal LCS Developmental Testing and Operational Testing (DT/OT), including Live Fire Test and Evaluation (LFT&E), and procurement of T&E Ordnance. Execute DT and C4I integration and testing; aviation (manned and unmanned) integration; and modular mine countermeasure (MCM), anti-submarine warfare (ASW), and surface warfare (SUW) mission package (MP) integration. ***FY 2016 Accomplishments:*** Flight 0+ Baseline: Conducted the LCS 4 Total Ship Survivability Trials (TSST). Conducted SUW Phase II DT, TECHEVAL and IOT&E on LCS 4. Started Air Defense test execution for Self Defense Test Ship testing in support of PRA on the IND Variant. Planned for and executed LCS 5 and LCS 6 Full Ship Shock Trials (FSSTs). Completed Phase 2 of Multi-Compartment Surrogate testing. Completed the Detailed Design Integrated Survivability Assessment					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603581N / *(U)LITTORAL COMBAT SHIP*	**Project (Number/Name)** 3096 / *Littoral Combat Ship*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Report (DDISAR) for LCS Freedom variant. Continued developing the DDISAR for LCS Independence variant. Development of the final Survivability Assessment Report (SAR) was started. ***FY 2017 Plans:*** Flight 0+ Baseline: Continue planning for Air Defense test planning and execution for Self Defense Test Ship, and Seaframe testing in support of PRA on the IND Variant. Conduct Vertical Take-off and Landing Unmanned Aerial Vehicle (VTUAV) Dynamic Interface testing on the Independence variant. Complete Seaframe and SUW MP Increment 3 DT on the Freedom variant. Start planning for SUW MP TECHEVAL and OT on the Freedom variant. Complete post FSST availability on LCS 5 and LCS 6. Complete DDISAR for LCS Independence Variant. Continue work on Survivability Assessment Report (SAR). AW testing on the Independence variant. Begin planning for Calm Water Trials on the Freedom Variant. ***FY 2018 Base Plans:*** Complete Air Defense test planning and execution for Self Defense Test Ship, and Seaframe testing in support of PRA on the IND Variant. Conduct Vertical Take-off and landing Unmanned Aerial Vehicle (VTUAV) Dynamic Interface testing on the Freedom variant. Conduct SUW SSMM MP DT, TECHEVAL, and OT on the Freedom variant. Conduct SUW SSMM MP DT, TECHEVAL, and OT on the Independence variant. Continue work on Survivability Assessment Report (SAR). Conduct MCM L&R DT on Freedom variant. ***FY 2018 OCO Plans:*** N/A					
Title: Condition Based Maintenance	10.000	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: This line realigns Condition Based Maintenance funding from LCS Mission Modules RDTEN to LCS Hull RDTEN to align with congressional intent. ***FY 2016 Accomplishments:*** Funds procured the development of the Adaptive Diagnostic Electronic Portable Test (ADEPT) Distance Support Sensor Suite (ADSSS) system for the Littoral Combat Ship (LCS). The ADSSS is hardware that is connected to Combat System relevant sensor points for continuous monitoring and is connected to the shipboard network for					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603581N / *(U)LITTORAL COMBAT SHIP*	**Project (Number/Name)** 3096 / *Littoral Combat Ship*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
data upload. This provides Combat Systems (CS) Condition Based Maintenance (CBM) and Distance Support (DS) capability for the Navy. ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A					
Title: Frigate (Modified LCS) ***Articles:*** ***Description:*** The Frigate (FF) will be a multi-mission ship that will leverage the existing Littoral Combat Ship (LCS) designs, and focuses on anti-surface warfare and anti-submarine warfare capabilities (SUW/ASW) to increase lethality and survivability. The Frigate adds capability while maximizing the LCS investments made to date in the small surface combatant force. Modifications will include over-the-horizon surface-to-surface missile system, upgraded Air Defense weapons and sensors, advanced electronic warfare system and improved decoys, and all elements of the SUW and ASW mission packages (horizon surface-to-surface missile system, 30mm guns, variable depth sonar, towed array and torpedo defense). This line accounts for funding transferred from the newly established Frigate PE (0603599N PU 3086) back to LCS PE to account for funding already allocated and obligated during the FY 2016 Continuing Resolution. ***FY 2016 Accomplishments:*** Conduct design activities to support HM&E layout and arrangements associated with additional FF capability. Conduct system engineering efforts to support system requirements review (SRR) and prepare for future preliminary design review (PDR), including decomposing CDD requirements into system and warfare system element specifications, defining logical and physical interfaces, finalizing warfare system element selections, and conducting analyses to refine acquisition and contracting approaches for the FF systems. Conduct aviation and C4I integration activities.	10.000 -	0.000 -	0.000 -	0.000 -	0.000 -

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603581N / *(U)LITTORAL COMBAT SHIP*	**Project (Number/Name)** 3096 / *Littoral Combat Ship*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Remaining FY 2016 Accomplishments and Schedule are in PE 0603599N, PU 3086 ***FY 2017 Plans:*** FY 2017 Plans are in PE 0603599N, PU 3086 ***FY 2018 Base Plans:*** FY 2018 Plans are in PE 0603599N, PU 3086 ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	86.858	28.906	20.841	0.000	20.841

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• SCN/2127: *Littoral Combat Ship (LCS)*	1,414.265	1,211.625	663.011	-	663.011	758.194	1,235.410	1,155.019	2,061.188	8,770.151	27,655.663
• OPN/1600: *LCS Common Mission Modules Equipment*	23.061	27.840	34.666	-	34.666	29.388	30.221	24.282	24.666	806.332	1,381.443
• OPN/0944: *LCS Class Support Equipment*	39.349	54.823	47.955	-	47.955	75.882	77.029	65.380	66.683	0.000	512.436
• OPN/1601: *LCS MCM Mission Modules*	67.451	57.146	55.870	-	55.870	73.903	75.373	158.293	188.844	1,406.438	2,165.302
• OPN/1603: *LCS SUW Mission Modules*	35.228	22.466	52.960	-	52.960	56.556	30.093	12.454	42.929	415.399	732.617
• OPN/1605: *Remote Minehunting System (RMS)*	53.077	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	53.077
• RDTEN/3129: *LCS Mission Package Development*	188.872	160.058	116.871	-	116.871	78.302	52.996	32.560	22.721	Continuing	Continuing
• OPN/1602: *LCS ASW Mission Modules*	0.000	31.952	0.000	-	0.000	82.188	54.553	90.354	61.808	140.673	461.528
• RDTEN/3086: *Frigate*	18.965	84.900	143.450	-	143.450	141.599	73.415	76.460	71.098	Continuing	Continuing
• OPN/1604: *LCS In-Service Modernization*	0.000	0.000	74.426	-	74.426	61.755	47.317	61.361	66.667	0.000	311.526

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603581N / *(U)LITTORAL COMBAT SHIP*	**Project (Number/Name)** 3096 / *Littoral Combat Ship*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost

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. The Navy's Acquisition Strategy supports procurement of LCS ships from FY17 through FY19 as currently budgeted. The PB 18 procurement profile was modified to procure two ships in FY17, one ship in FY18, and one ship in FY19.

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: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603581N / *(U)LITTORAL COMBAT SHIP*	Project (Number/Name) 3096 / *Littoral Combat Ship*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
LCS 1 & 2 Shore Trainers	C/CPAF	LM, BIW : Various	56.536	0.000		0.000		0.000		-		0.000	0.000	56.536	-
Program Office Support	Various	Various : Various	20.540	0.000		0.000		0.000		-		0.000	0.000	20.540	-
Training Development - Support	WR	NAWC/TSD : Orlando, FL	23.174	0.000		0.000		0.000		-		0.000	0.000	23.174	-
LCS1 & LCS2 Bridge Part Task Trainers	SS/FFP	Computer Sciences Corp. (CSC) : Falls Church, VA	4.578	0.000		0.000		0.000		-		0.000	0.000	4.578	-
LCS1 & LCS2 TAO Trainers	C/CPFF	Northrop Grumman Corp. : Falls Church, VA	6.204	0.000		0.000		0.000		-		0.000	0.000	6.204	-
LCS Mission Bay Trainer	C/FFP	Cubic Corp : Orlando, FL	28.283	0.000		0.000		0.000		-		0.000	0.000	28.283	-
Training Development - Support	WR	Various : Various	13.471	0.000		0.000		0.000		-		0.000	0.000	13.471	-
Training Development - Industry	C/CPAF	Lockheed Martin : Various	13.300	0.000		0.000		0.000		-		0.000	0.000	13.300	-
Training Operations	WR	NSWC DD/CSCS : Various	6.010	0.000		0.000		0.000		-		0.000	0.000	6.010	-
Distance Support	WR	NAWC TSD : Orlando, FL	4.900	0.000		0.000		0.000		-		0.000	0.000	4.900	-
Virtual Ship Training System (VSTS)	C/FFP	TBD : TBD	10.575	0.000		0.000		0.000		-		0.000	0.000	10.575	-
Deck IVSE	C/FFP	TBD : TBD	8.317	0.000		0.000		0.000		-		0.000	0.000	8.317	-
Combat Systems IVSE	C/FFP	TBD : TBD	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
Readiness Control Officer LCS 1 IVSE	C/FFP	Cubic Corp : Orlando, FL	2.772	0.000		0.000		0.000		-		0.000	0.000	2.772	-
Readiness Control Officer LCS 2 IVSE	C/FFP	Cubic Corp : Orlando, FL	2.803	0.000		0.000		0.000		-		0.000	0.000	2.803	-
Mission Bay Trainer Haptics IVSE	C/FFP	Cubic Corp : Orlando, FL	4.596	0.000		0.000		0.000		-		0.000	0.000	4.596	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering Plant Technician (EPT) LCS 1 IVSE	C/FFP	Cubic Corp : Orlando, FL	15.733	0.000		0.000		0.000		-		0.000	0.000	15.733	-
Engineering Plant Technician (EPT) LCS 2 IVSE	C/FFP	Cubic Corp : Orlando, FL	15.524	0.000		0.000		0.000		-		0.000	0.000	15.524	-
Condition Based Maintenance	SS/FFP	MIKROS : Wash, DC	0.000	4.820	Jul 2016	0.000		0.000		-		0.000	0.000	4.820	-
Frigate Warfare Systems Development	C/CPAF	Raytheon : Not Specified	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
Class Design Services	SS/CPAF	LM, GD : Various	48.340	0.000		0.000		0.000		-		0.000	0.000	48.340	-
Final Design(Flight 0)	C/CPAF	LM, BIW : Various	175.263	0.000		0.000		0.000		-		0.000	0.000	175.263	-
Flight 0 C41	WR	PEO C41 : Various	5.506	0.000		0.000		0.000		-		0.000	0.000	5.506	-
SH-60B Datalink	C/CPAF	LM, BIW : Various	2.435	0.000		0.000		0.000		-		0.000	0.000	2.435	-
Frigate Ship Design Modifications	C/CPAF	LM : Various	0.000	1.821	Nov 2015	0.000		0.000		-		0.000	0.000	1.821	-
Frigate Ship Design Modifications	C/CPAF	Austal : Mobile, AL	0.000	1.524	Nov 2015	0.000		0.000		-		0.000	0.000	1.524	-
Frigate Aviation Integration Development	WR	NAWC AD : Patuxent, MD	0.000	0.088	Nov 2015	0.000		0.000		-		0.000	0.000	0.088	-
Frigate C4I Development	WR	PEO C4I : San Diego, CA	0.000	0.253	Nov 2015	0.000		0.000		-		0.000	0.000	0.253	-
Frigate C4I Development	WR	SPAWAR : San Diego, CA	0.000	0.100	Nov 2015	0.000		0.000		-		0.000	0.000	0.100	-
Frigate C4I Development	WR	SPAWAR : Charleston, SC	0.000	0.276	Nov 2015	0.000		0.000		-		0.000	0.000	0.276	-
Frigate Common Combat Management System Development (CMS)	C/CPAF	LM : Various	0.000	0.105	Nov 2015	0.000		0.000		-		0.000	0.000	0.105	-
Frigate Common Combat Management System Development (CMS)	WR	NSWC PHD : Port Hueneme, CA	0.000	0.072	Nov 2015	0.000		0.000		-		0.000	0.000	0.072	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Frigate Warfare Systems Development	WR	NSWC DD : Dahlgren, VA	0.000	1.565	Nov 2015	0.000		0.000		-		0.000	0.000	1.565	-
Frigate Warfare Systems Development	WR	Various : Various	0.000	0.170	Nov 2015	0.000		0.000		-		0.000	0.000	0.170	-
Frigate Warfare Systems Development	C/CPAF	Raytheon : Various	0.000	0.112	Dec 2015	0.000		0.000		-		0.000	0.000	0.112	-
Frigate Over the Horizon (OTH) Missile Development	WR	Various : Various	0.000	0.102	Dec 2015	0.000		0.000		-		0.000	0.000	0.102	-
		Subtotal	468.860	11.008		0.000		0.000		-		0.000	0.000	479.868	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Engineering Support	WR	NSWC/DD : Dahlgren, VA	64.740	3.340	Feb 2016	2.387	Apr 2017	2.023	Nov 2017	-		2.023	4.083	76.573	-
Government Engineering Support	WR	NSWC/PC : Panama City, FL	27.987	0.000	Feb 2016	0.000		0.000		-		0.000	0.000	27.987	-
Government Engineering Support	WR	NUWC/N : Newport, RI	9.674	0.185	Feb 2016	0.180	Apr 2017	0.153	Nov 2017	-		0.153	0.000	10.192	-
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	66.908	3.973	Feb 2016	2.245	Apr 2017	1.906	Nov 2017	-		1.906	3.941	78.973	-
Government Engineering Support	Various	Government Activities : Various	48.020	2.396	Feb 2016	2.359	Apr 2017	2.000	Nov 2017	-		2.000	4.136	58.911	-
Contractor Engineering Support	C/CPAF	Alion/CSC : Arlington, VA	48.423	1.379	Apr 2016	0.000		0.000		-		0.000	0.000	49.802	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
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Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Engineering Support	C/CPAF	Various : Various	18.473	2.144	Mar 2016	2.198	Apr 2017	1.863	Feb 2018	-		1.863	3.759	28.437	-
Government Engineering Support	WR	NSWC/CD : Bethesda, MD	2.880	1.763	Mar 2016	5.470	Apr 2017	4.592	Nov 2017	-		4.592	9.558	24.263	-
Government Engineering Support	WR	PEO IWS : Various	0.000	0.300	Mar 2016	3.088	Jan 2017	2.613	Dec 2017	-		2.613	5.310	11.311	-
Contractor Engineering Support	WR	General Dynamics Bath Iron Works : Bath, ME	0.000	0.933	Dec 2015	0.000		0.000		-		0.000	0.000	0.933	-
Condition Based Maintenance	WR	NSWC/PHD : Port Hueneme, CA	0.000	5.180	Jun 2016	0.000		0.000		-		0.000	0.000	5.180	-
Government Engineering Support	C/BA	NSWC/PHD : Port Hueneme, CA	0.000	0.788	Jun 2016	0.070	Apr 2017	0.059	Nov 2017	-		0.059	0.000	0.917	-
FY17 Continuing Resolution	Various	Various : Various	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
Frigate Government Engineering Support	WR	NSWC/CD : Carderock, MD	0.000	1.179	Nov 2015	0.000		0.000		-		0.000	0.000	1.179	-
Frigate Government Engineering Support	WR	NSWC/PD : Philadelphia, PA	0.000	0.468	Nov 2015	0.000		0.000		-		0.000	0.000	0.468	-
Frigate Contractor Engineering Support	C/CPAF	Alion : Arlington, VA	0.000	0.973	Dec 2015	0.000		0.000		-		0.000	0.000	0.973	-
Frigate Contractor Engineering Support	C/CPAF	Booz Allen Hamilton : McLean, VA	0.000	0.345	Dec 2015	0.000		0.000		-		0.000	0.000	0.345	-
		Subtotal	329.889	25.346		17.997		15.209		-		15.209	30.787	419.228	-

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 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	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603581N / *(U)LITTORAL COMBAT SHIP*	Project (Number/Name) 3096 / *Littoral Combat Ship*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test & Evaluation	WR	NSWC/PHD : Port Hueneme, CA	55.378	1.500	Feb 2016	0.677	Apr 2017	0.416	Nov 2017	-		0.416	0.000	57.971	-
Test & Evaluation	WR	NSWC/PD : Philadelphia, PA	59.228	6.200	Feb 2016	0.916	Apr 2017	0.825	Nov 2017	-		0.825	0.000	67.169	-
Test & Evaluation	WR	NSWC/PC : Panama City, FL	16.328	0.086	Feb 2016	0.059	Apr 2017	0.000		-		0.000	0.000	16.473	-
Test & Evaluation	WR	COMOPTEVFOR : Norfolk, VA	14.134	0.429	Feb 2016	0.330	Apr 2017	0.000		-		0.000	0.000	14.893	-
Test & Evaluation	WR	NSWC/COR : Corona, CA	16.990	0.756	Feb 2016	0.440	Apr 2017	0.245	Nov 2017	-		0.245	0.000	18.431	-
Test & Evaluation	WR	Government Activities : Various	68.776	2.096	Feb 2016	0.194	Apr 2017	0.500	Feb 2018	-		0.500	0.000	71.566	-
Test & Evaluation	C/CPAF	LM/GD/Austal : Various	64.270	14.056	May 2016	1.850	Nov 2016	0.890	Jan 2018	-		0.890	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	16.507	5.395	Mar 2016	0.642	Apr 2017	0.000		-		0.000	0.000	22.544	-
FSST Support	WR	NAVAIR : Patuxent River, MD	0.000	3.872	Feb 2016	0.615	Jan 2017	0.000		-		0.000	0.000	4.487	-
Range Support	WR	NAWC/WD : Pt. Mugu, CA	0.000	2.693	Mar 2016	0.775	Feb 2017	0.000		-		0.000	0.000	3.468	-
Test & Evaluation	WR	NSWC/CD : Bethesda, MD	6.555	9.587	Mar 2016	3.716	Jan 2017	2.756	Nov 2017	-		2.756	0.000	22.614	-
FSST Support	C/BA	National Science Foundation : Arlington, VA	0.000	2.321	Feb 2016	0.350	Apr 2017	0.000		-		0.000	0.000	2.671	-
FSST Support	C/BA	NAVFAC Atlantic : Virginia Beach, VA	0.000	0.759	May 2016	0.000		0.000		-		0.000	0.000	0.759	-
Test & Evaluation	C/BA	Naval Research Laboratory : Washington, DC	0.000	0.754	Mar 2016	0.345	Apr 2017	0.000		-		0.000	0.000	1.099	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603581N / *(U)LITTORAL COMBAT SHIP*	Project (Number/Name) 3096 / *Littoral Combat Ship*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
FY17 Continuing Resolution	Various	Various : Various	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
		Subtotal	361.572	50.504		10.909		5.632		-		5.632	0.000	428.617	-

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 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	-
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	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	1,193.126	86.858		28.906		20.841		-		20.841	30.787	1,360.518	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603581N / *(U)LITTORAL COMBAT SHIP*	**Project (Number/Name)** 3096 / *Littoral Combat Ship*

LCS Seaframe Program Schedule

PB 2018	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22
Ship Procurement Profile	3	3	2(3)	1	1			
Hull Number	21-22, 24	23, 25-26	27-29	30	31			
Flight 0+ LCS 4 (GD)	SUW IOT&E, OWLD, IOC, TSST		Deployed					
Lockheed Martin Block Buy (Flight 0+) LCS 5	Delivery	FSST						
Lockheed Martin Block Buy (Flight 0+) LCS 7AF	Fund FY15	LCS 23	LCS 7, 9, 11	13, 15	17, 19	21, 23		
Austal USA Block Buy (Flight 0+) LCS 6	Delivery	FSST						
Austal USA Block Buy (Flight 0+) LCS 8AF	Fund FY15	LCS 8	10, 12, 14	16, 18	20, 22	24		
FY16 Priced Options		Award LCS 25/26	Award FY17	Award FY18	Award FY19		LCS 25 / 26	

Seaframe:
Contract Award/ Annual Funding
Delivery
OWLD
Mission Package:
SUW MP
Fill = Complete

Acronyms 15 Mar 17
GD: General Dynamics
FSST: Full Ship Shock Trial
AF: And Follow
SUW: Surface Warfare
MP: Mission Package
OWLD: Obligation Work Limiting Date
TSST: Total Ship Survivability Test
IOT&E: Initial Operational Test & Evaluation
IOC: Initial Operational Capability
FF: Frigate
ECP: Engineering Change Proposal
DAB: Defense Acquisition Board
IPR: In-Process Review

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603581N / *(U)LITTORAL COMBAT SHIP*	**Project (Number/Name)** 3096 / *Littoral Combat Ship*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3096				
TSST - LCS 4: Total Ship Survivability Trial (TSST) LCS 4	2	2016	2	2016
FSST - LCS 5: LCS 5 FSST	4	2016	4	2016
FSST - LCS 6: LCS 6 FSST	3	2016	4	2016
DDISAR - FRE: Detailed Design Integrated Survivability Assessment Report (DDISAR) - Freedom	1	2016	2	2017
DDISAR - IND: Detailed Design Integrated Survivability Assessment Report (DDISAR) - Independence	3	2016	4	2017
TECHEVAL SUW Phase II - LCS 4: Technical Evaluation (TECHEVAL) Phase II with SUW MP	2	2016	3	2016
IOT&E PSUW hase II - LCS 4: Initial Operational Test and Evaluation (IOT&E) Phase II with SUW MP	3	2016	3	2016
IOT&E PSUW hase II - LCS 4: Self Defense Test Ship (SDTS) Testing - IND	4	2016	1	2018
LCS SAR: LCS Survivability Assessment Report (SAR)	2	2016	1	2019
Multi-Compartment Surrogate Test: LFT&E Testing	1	2016	3	2016
Seaframe PRA Testing (IND): Seaframe Probability of Raid Annihilation (PRA) Testing	4	2017	1	2018
VTUAV Dynamic Interface Testing - IND: Vertical Take-off and Landing Unmanned Aerial Vehicle (VTUAV) Dynamic Interface Testing	2	2017	2	2017
TECHEVAL SUW - FRE: Technical Evaluation (TECHEVAL) SUW SSMM MP - Freedom variant	1	2018	1	2018
IOT&E SUW - FRE: Initial Operational Test and Evaluation (IOT&E) SUW SSMM MP - Freedom variant	1	2018	2	2018
TECHEVAL MCM - FRE: Technical Evaluation (TECHEVAL) with MCM MP - Freedom variant	4	2018	4	2018

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603581N / *(U)LITTORAL COMBAT SHIP*	**Project (Number/Name)** 3096 / *Littoral Combat Ship*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
DT MCM - FRE: Developmental Testing (DT) with MCM MP - Freedom variant	4	2018	4	2018
DT SUW - FRE: Surface Warfare (SUW) Developmental Test (DT) - Freedom variant	4	2017	4	2017
DT SUW - IND: Surface Warfare (SUW) Developmental Test (DT) - Independence variant	1	2018	2	2018
TECHEVAL SUW - IND: Technical Evaluation (TECHEVAL) SUW SSMM MP - Independence variant	3	2018	3	2018
IOT&E SUW - IND: Initial Operational Test and Evaluation (IOT&E) SUW SSMM MP	4	2018	4	2018
AW - IND: Air Warfare (AW) testing - Independence variant	4	2018	4	2018
AW - IND: Anti-Submarine Warfare (ASW) Developmental Test (DT) - Independence Variant	4	2018	4	2018
VTUAV Dynamic Interface Testing - FRE: Vertical Take-off and Landing Unmanned Aerial Vehicle (VTUAV) Dynamic Interface Testing	1	2018	1	2018

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603581N / *(U)LITTORAL COMBAT SHIP*	Project (Number/Name) 4506 / *LCS Training*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
4506: *LCS Training*	0.000	8.085	22.724	20.150	-	20.150	18.288	0.973	0.981	0.986	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 does not contain trainee sailors to receive on-the-job training. Consequently, 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 Key Performance Parameter (KPP) requirements.

RDT&E funds are used to develop advanced Immersive Virtual Ship Environments (IVSE), or Virtual Reality (VR) courseware and associated simulators to achieve the training objectives. Additionally, after fielding these systems and courseware, RDTE funds will be utilized to upgrade training to maintain conformity with LCS configurations and approved operational technical manuals and procedures. RDTE funds are also used to test and evaluate training devices to verify compliance with requirements.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: LCS Total System Training Architecture	8.085	22.724	20.150	0.000	20.150
Articles:	-	-	-	-	-
Description: LCS is a minimally-manned ship, and the small crew does not contain trainee sailors to receive on-the-job training. Consequently, 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 Key Performance Parameter (KPP) requirements. RDT&E funds are used to develop advanced Immersive Virtual Ship Environments (IVSE), or Virtual Reality (VR) courseware and associated simulators to achieve the training objectives. Additionally, after fielding these systems and courseware, RDTE funds will be utilized to upgrade training to maintain conformity with LCS configurations and approved operational technical manuals and procedures. RDTE funds are also used to test and evaluate training devices to verify compliance with requirements.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603581N / *(U)LITTORAL COMBAT SHIP*	**Project (Number/Name)** 4506 / *LCS Training*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
FY 2016 Accomplishments: RDTE funding provided to Naval Air Warfare Center Training Systems Division (NAWCTSD) supports program management, contracting, research and engineering, test and evaluation, logistics and industrial ops, finance management support and travel requirements, as the LCS Training System Executive Agent. Funding is provided to develop and oversee Immersive Virtual Ship Environments (IVSE) courseware for LCS EPT, RCO, and deck operations; and complete Mission Bay Trainer and VSTS development. This funding ensures support of the LTF San Diego DoD Information Assurance Certification and Accreditation Package (DIACAP), as well as NAVFAC efforts preparing for additional LCS homeports required by the Strategic Laydown Plan. Delivered Freedom and Independence Tactical Action Officer Trainers to SWOS, Newport. Delivered Engineering Plant technician IVSE Courseware, Mission Bay Trainer to Freedom and Independence training cranes and VSTS to the San Diego Training Facility (LTF). also, began the development of the first phase of the Deck and Combat Systems IVSE Ops and Maintenance courseware and continued RCO IVSE courseware development.					
FY 2017 Plans: FY17 funding increase directly supports the development of various training courseware to provide the fleet with these needed training capabilities as LCS hull deliveries increase. RDTE funding provides Naval Air Warfare Center Training Systems Division (NAWCTSD) program management, contracting, research and engineering, test and evaluation, logistics and industrial ops, finance management support and travel requirements, as the LCS Training System Executive Agent. Funding is provided to oversee completion of IVSE courseware development for LCS deck operations and phase two of IVSE combat systems courseware, oversee performance of the development effort, and provide other functions in support of the LCS Fleet Introduction Program Office (PMS 505). Phase two of IVSE combat system includes the development of 4 courses: Navigation Systems, Radio Communications Subsystem, Search Radar, and Weapon Systems.					
FY 2018 Base Plans: Funding provides for the development and testing of various training courseware to provide the fleet with these needed training capabilities as LCS hull deliveries increase. RDTE funding provides Naval Air Warfare Center Training Systems Division (NAWCTSD) program management, contracting, research and engineering, test and evaluation, logistics and industrial ops, finance management support and travel requirements, as					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603581N / *(U)LITTORAL COMBAT SHIP*	**Project (Number/Name)** 4506 / *LCS Training*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
the LCS Training System Executive Agent. Funding is provided to oversee completion of IVSE courseware development for LCS deck operations and phase two of IVSE combat systems courseware and VTUAV/MH-60 courseware, oversee performance of the development effort, and provide other functions in support of the LCS Fleet Introduction Program Office (PMS 505). Phase two of IVSE combat system includes the development of 4 courses: Navigation Systems, Radio Communications Subsystem, Search Radar, and Weapon Systems. This funding also supports continued NAVFAC efforts preparing for additional LCS homeports required by the Strategic Laydown plan. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	8.085	22.724	20.150	0.000	20.150

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 1320: *LCS Training*	54.851	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• 5664: *Surface Training Equipment*	0.000	19.136	12.788	-	12.788	31.566	18.253	10.000	0.000	Continuing	Continuing

Remarks

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 FY19. 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 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

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603581N / *(U)LITTORAL COMBAT SHIP*	**Project (Number/Name)** 4506 / *LCS Training*

(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: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603581N / *(U)LITTORAL COMBAT SHIP*	**Project (Number/Name)** 4506 / *LCS Training*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Deck/Mission Bay Courseware	C/FFP	Cubic : Orlando, FL	0.000	1.878	Feb 2016	3.450	Feb 2017	0.000		-		0.000	0.000	5.328	-
Combat Systems Courseware	C/FFP	Cubic : Orlando, FL	0.000	0.000		9.665	Mar 2017	10.145	Mar 2018	-		10.145	7.800	27.610	-
VSTS	C/FFP	Triton JV, LLC : Orlando, FL	0.000	0.600	Feb 2016	0.000	Feb 2017	0.000		-		0.000	0.000	0.600	-
Training Development - Support	WR	NAWC/TSD : Orlando, FL	0.000	4.547	Nov 2015	3.612	Nov 2016	4.000	Nov 2017	-		4.000	Continuing	Continuing	Continuing
VTUAV/MH60	C/FFP	TBD : TBD	0.000	0.000		0.000	Mar 2017	0.000	Mar 2018	-		0.000	6.270	6.270	-
		Subtotal	0.000	7.025		16.727		14.145		-		14.145	-	-	-

Remarks

Years prior to FY2016 are reflected in 3096 Project Unit.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Human Systems Integration	WR	NSWC, DD : Dahlgren Virginia	0.000	0.320	Nov 2015	0.204	Nov 2016	0.180	Nov 2017	-		0.180	Continuing	Continuing	Continuing
Information Assurance	WR	NSWC, DN : Dam Neck, VA	0.000	0.400	Feb 2016	1.214	Feb 2017	1.500	Nov 2017	-		1.500	Continuing	Continuing	Continuing
Training ISEA	WR	NSWC/PHD : Port Huenume, CA	0.000	0.200	Feb 2016	0.541	Nov 2016	0.500	Nov 2017	-		0.500	Continuing	Continuing	Continuing
Warfare Center SME	WR	NAVFAC : Washington, DC	0.000	0.000		0.000	Mar 2017	0.170	Nov 2017	-		0.170	Continuing	Continuing	Continuing
		Subtotal	0.000	0.920		1.959		2.350		-		2.350	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603581N / *(U)LITTORAL COMBAT SHIP*	**Project (Number/Name)** 4506 / *LCS Training*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Office Support	C/CPAF	Various : Various	0.000	0.140	Mar 2016	4.038	Mar 2017	3.655	Mar 2018	-		3.655	Continuing	Continuing	Continuing
		Subtotal	0.000	0.140		4.038		3.655		-		3.655	-	-	-

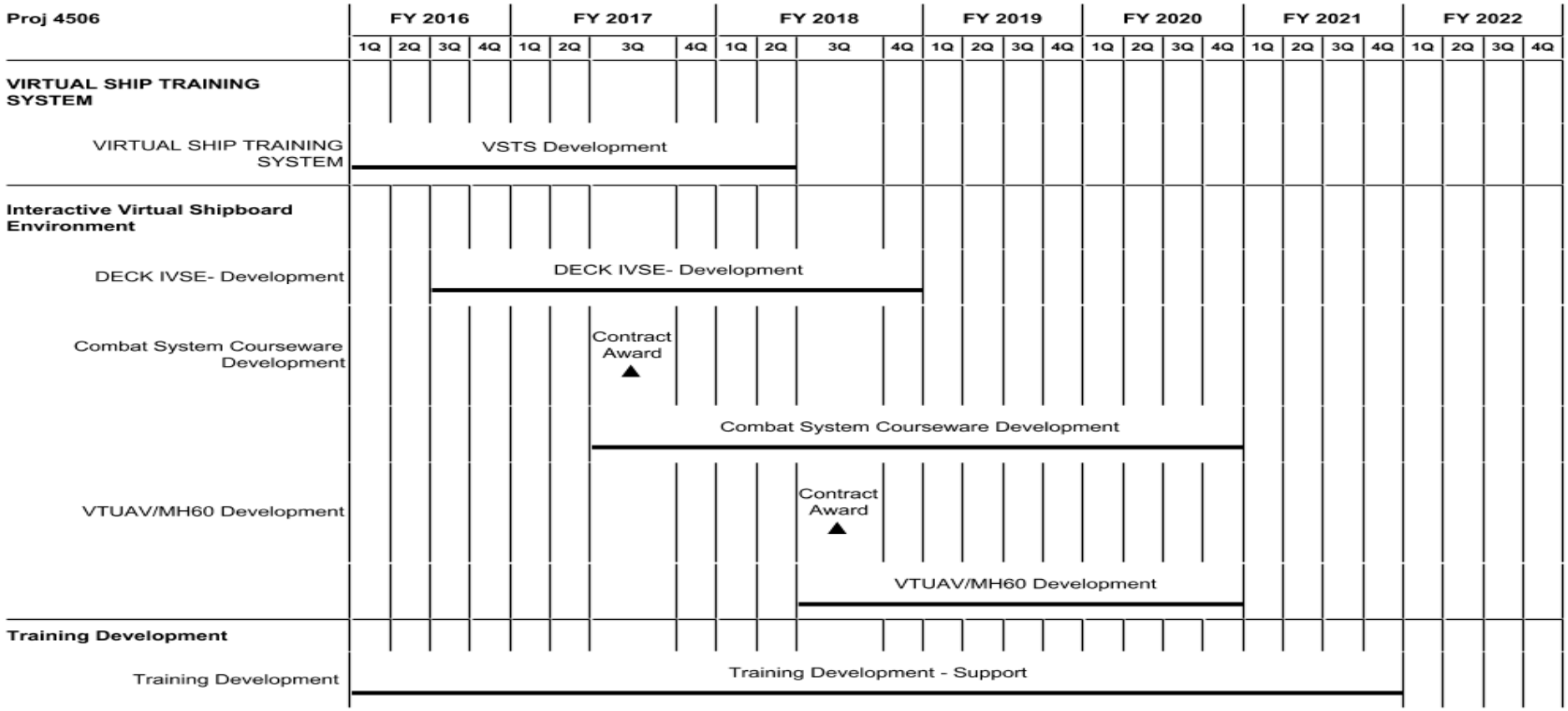
Remarks

Years prior to FY2016 are reflected in 3096 Project Unit.

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	8.085		22.724		20.150		-		20.150	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603581N / *(U)LITTORAL COMBAT SHIP*	**Project (Number/Name)** 4506 / *LCS Training*



2018PB - 0603581N - 4506

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603581N / *(U)LITTORAL COMBAT SHIP*	**Project (Number/Name)** 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	2016	2	2018
Interactive Virtual Shipboard Environment: DECK IVSE- Development: DECK IVSE-Development	3	2016	4	2018
Interactive Virtual Shipboard Environment: Combat System Courseware Development: Combat System Courseware Contract Award	3	2017	3	2017
Interactive Virtual Shipboard Environment: Combat System Courseware Development: Combat System Courseware Development	3	2017	4	2020
Interactive Virtual Shipboard Environment: VTUAV/MH60 Development: VTUAV/MH60 Contract Award	3	2018	3	2018
Interactive Virtual Shipboard Environment: VTUAV/MH60 Development: VTUAV/MH60 Development	3	2018	4	2020
Training Development: Training Development: Training Development - Support	1	2016	4	2021

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603581N / *(U)LITTORAL COMBAT SHIP*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
9999: *Congressional Adds*	0.000	14.483	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	14.483
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

LCS is a minimally-manned ship, and the small crew does not contain trainee sailors to receive on-the-job training. Consequently, 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 Key Performance Parameter (KPP) requirements.

RDT&E funds are used to develop advanced Immersive Virtual Ship Environments (IVSE) courseware and associated simulators to achieve the training objectives. Additionally, after fielding these systems and courseware, RDTE funds will be utilized to upgrade training to maintain conformity with LCS.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017
Congressional Add: LCS Training Courseware	14.483	0.000
FY 2016 Accomplishments: RDTE funding provided to Cubic Corporation via Naval Air Warfare Center Training Systems Division (NAWCTSD) in support of research and engineering, test and evaluation, logistics and industrial ops. Funding is provided to complete student and instructor guides, instructor IVSE system support guides, and phase one of IVSE combat system courseware development. Phase one includes the development of four courses: Command & Control Systems, Electronic Warfare Subsystems (EWS), Global Command & Control Systems (GCCS) and Total Ships Computing Environment (TSCE).		
FY 2017 Plans: N/A		
Congressional Adds Subtotals	14.483	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 1320: *LCS Training*	54.851	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• 5664: *Surface Training Equipment*	0.000	38.272	7.410	-	7.410	23.279	19.369	0.000	0.000	Continuing	Continuing

Remarks

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603581N / *(U)LITTORAL COMBAT SHIP*	**Project (Number/Name)** 9999 / *Congressional Adds*

D. Acquisition Strategy

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).

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-2, RDT&E Budget Item Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603582N *I Combat System Integration*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	385.453	32.020	26.530	24.674	-	24.674	26.110	25.672	25.360	25.707	Continuing	Continuing
0164: *Combat System Integration*	361.660	23.285	26.530	20.274	-	20.274	20.610	18.672	17.660	18.007	Continuing	Continuing
3312: *MTMD-Maritime Theater Missile Defense Forum*	23.793	8.735	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	32.528
3425: *Digital Warfare Office (DWO) MBE&DT Development*	0.000	0.000	0.000	4.400	-	4.400	5.500	7.000	7.700	7.700	Continuing	Continuing

A. Mission Description and Budget Item Justification

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 Office (DWO) 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.

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, and Intelligence Modernization Process (C5IMP) and Fleet Readiness (C5I Surveillance and Reconnaissance (C5ISR)). 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) Navigation Certification (NAVCERT) and Electronic Charting and Display System - Navy (ECDIS-N) Certification, which certifies ship electronic charting capability as well as certifies the accurate transmission of navigation data to combat and weapons systems.

(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) concept 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 U.S. Fleet Forces Command and Command (CFFC) and U.S. Pacific Fleet (PACFLT) 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) 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 conduct of their tactical responsibilities.

$3 Million is required to support approved increases for the Digital Warfare Office (DWO). 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.

DWO funding will be moved to PU 3425 starting in FY18.

(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 cybersecurity posture in support of Warfare Systems Certification per NAVSEAINST 9410.2 (Series).

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** 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: FY 2018 Navy					Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*			R-1 Program Element (Number/Name) PE 0603582N *I Combat System Integration*		
B. Program Change Summary ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**
Previous President's Budget	32.561	23.530	22.055	-	22.055
Current President's Budget	32.020	26.530	24.674	-	24.674
Total Adjustments	-0.541	3.000	2.619	-	2.619
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.540	0.000			
• Program Adjustments	0.000	3.000	2.510	-	2.510
• Rate/Misc Adjustments	-0.001	0.000	0.109	-	0.109

Change Summary Explanation

FY17: $3.000 million added to stand up Digital Warfare Office.

FY18: $4.400 million increase to continue FY17 effort to establish Digital Warfare Office.

Funding reduced by $1.800 million to account for the availability of prior year execution balances.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603582N / *Combat System Integration*	Project (Number/Name) 0164 / *Combat System Integration*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0164: *Combat System Integration*	361.660	23.285	26.530	20.274	-	20.274	20.610	18.672	17.660	18.007	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, and Intelligence Modernization Process (C5IMP) and Fleet Readiness (C5I Surveillance and Reconnaissance (C5ISR)). 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) Navigation Certification (NAVCERT) and Electronic Charting and Display System - Navy (ECDIS-N) Certification, which certifies ship electronic charting capability as well as certifies the accurate transmission of navigation data to combat and weapons systems.

(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) concept 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 U.S. Fleet Forces Command and Command (CFFC) and U.S. Pacific Fleet (PACFLT) requirement that all strike forces undergo interoperability assessment testing in the DIIAC prior to deployment. The RDT&E component of the SFI budget funds the staffing and operations of this distributed test bed, complimented by the OPN SFI funding that upgrades and maintains the physical components of the test bed. Interoperability certification results are used to develop Fleet tactical tools (Capabilities & Limitations (C&L) 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 conduct 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 Cybersecurity posture in support of Warfare Systems Certification per NAVSEAINST 9410.2 (Series).

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603582N / *Combat System Integration*	**Project (Number/Name)** 0164 / *Combat System Integration*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Navigation System Certification (NAVCERT)	1.824	1.583	1.495	0.000	1.495
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 and reliable navigation and system operation. Forecasting the schedule for NAVCERT is based on the projection of schedule drivers 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 NAVCERT projected period to period. This project funds assessments in support of new capability upgrades and modernization funded by the cognizant program office. The certification verifies the accuracy of the data originating from 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 Charting and Display System Navy (ECDIS-N). This program meets OPNAV ECDIS-N and Operational Safety and Assurance certification requirements in accordance with the guidance in SECNAVINST 5400.15C and OPNAVINST 9420.2, and in the current draft of OPNAVINST 9420.1.

FY 2016 Accomplishments:
(1) Completed to perform critical U.S. Navy NAVCERT efforts to include the conduct of 26 NAVCERTs on Cruisers, Destroyers, Aircraft Carriers, and Amphibious Ships.

FY 2017 Plans:
(1) Perform critical U.S. Navy NAVCERT efforts to include the conduct of 39 NAVCERTs on Cruisers, Destroyers, Aircraft Carriers, and Amphibious Ships. Issue update of NAVSEA Instruction 9420.2A (Naval Warfare Systems Certification Policy). Achieve cost efficiencies by leveraging test results from conjunctive alterations to navigation systems during modernization periods.

FY 2018 Base Plans:
(1) Conduct 20 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 periods.

FY 2018 OCO Plans:

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603582N / *Combat System Integration*	**Project (Number/Name)** 0164 / *Combat System Integration*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A					
Title: Command, Control, Communications, Computer, Combat Systems, and Intelligence Modernization Process (C5IMP) and Fleet Readiness (C5ISR)	1.780	2.003	1.886	0.000	1.886
Articles:	-	-	-	-	-
Description: This project is required to support the Fleet C5I Modernization Policy (per COMUSFLTFORCOM/ COMPACFLT Inst. 4720.3B) to manage operational risks associated with C5I Surveillance and Reconnaissance (C5ISR) modernization in both afloat and ashore units ensuring deploying units receive improved, interoperable, and certified warfighting capabilities in order to meet theater operational requirements. Forecasting C5IMP/ 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 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. 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 (Baseline Change), 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 originally 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. Generally, a Baseline Manager (BLM) is assigned for each ship availability and provides continuous support associated with that ship's availability. Focus is on two key milestones (though Aircraft Carriers typically have one) known as Baseline Locks (BL) and a Planned "Not Authorized" (PNA) events, which are Fleet required events. The BLs and PNAs are the primary costable work items in the C5IMP process. Note, depending on when the ship's availability is scheduled (i.e., in which FY), there can be none, one or both events completed for that ship in a given year. Strike Group Engineers (SGEs) analyze planned C5I configurations of ships and Strike Groups; identify and analyze capability, interoperability, and modernization issues in a Strike Group context; assess impacts against requirements; and provide recommendations for resolution.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
FY 2016 Accomplishments: (1) Facilitated the review, assessment, and execution of C5I installations during approximately seventy one (71) CNO Availabilities which included sixty two (62) baseline locks (BL) and forty five (45) Planned not Authorized (PNA) events. The number of CNO Availabilities decreased from the initial PB2016 budget exhibit projection because ship schedules are very fluid and maintenance periods change as national tasking and other exigent circumstances arise. (2) Supported two (2) Combat Systems Integration (C5I) Modernization Conferences (NCMCs). (3) Supported twelve (12) Monthly Baseline Events and twelve (12) PNA review meetings. *Note: The twelve (12) Monthly Baseline Events and twelve (12) PNA Review Meetings are where the BLs and PNAs are delivered. ***FY 2017 Plans:*** (1) Facilitate reviews, assessments, and execution of C5I installations during approximately seventy two (72) CNO Availabilities. (2) Support two (2) NCMCs (3) Support twelve (12) Monthly Baseline Events where sixty three (63) BLs will be completed and twelve (12) PNA Review Meetings where fifty seven (57) PNAs will be completed. ***FY 2018 Base Plans:*** (1) Facilitate reviews, assessments, and execution of C5I installations during approximately seventy four (74) CNO Availabilities. (2) Support two (2) NCMCs (3) Support twelve (12) Monthly Baseline Events where sixty three (63) BLs will be completed and twelve (12) monthly PNA Review Meetings where forty nine (49) PNAs will be completed. ***FY 2018 OCO Plans:*** N/A					
Title: Interoperability Certification and Assessment	8.973	15.952	12.152	0.000	12.152
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					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
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 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 Office (DWO) to set Model Based Systems Engineering (MBSE) requirements, prioritize resources, and lead efforts on information interoperability and human/machine teaming. ***FY 2016 Accomplishments:*** (1) Completed three (3) Interoperability Land-Based test events that included the following: -Development interoperability test to support: SSDS 10.10.x; SSDS 10.10.02; SSDS 9.08.04; ACS BL 7.2.1; ACS BL 9.2 and ACS 9o8 -Certification test for ACS BL 9.C1 -Certification Interoperability Risk assessment & Report for ACS BL 9.C1					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
(2) Completed C&L and TIC TECHAIDS, normally a near constant yearly demand requirement, also addressed AEGIS Ashore (Romania). This resulted in updates to Interoperability C&L for: -Twenty three (23) Deploying Strike Group Ships (from a database containing 208 U.S. Surface Ships) -Ten (10) Naval Air Squadrons (covering F/A-18s, E-2Cs (only), MH-60Ss (only), EA-6Bs, EA-18Gs, P-3Cs and P-8As) -AEGIS Ashore (Romania) (3) Provided annual deliveries of Preliminary/Final TIC TECHAIDS to: -Forty (40) Carrier Strike Group (CSG) Ships -Six (6) Amphibious Ready Group (ARG) Ships -Seventeen (17) BMD Ships -Fifteen (15) Forward Deployed Naval Force (FDNF) Ships -Eighteen (18) Independent Deploying Ships (CRUDES, CVN, LCS and L-Ship) -AEGIS Ashore Site (Romania) -Four (4) Fleet Area Control and Surveillance Facility (FACSFAC) sites -Six (6) Maritime Operations Center (MOC) sites. (4) Completed engineering to support for two (2) systems Verification and Validation Tests.					
FY 2017 Plans: (1) Conduct three (3) Interoperability Land-Based test events including the following: -Development interoperability test to support: ACS 9.A2.0 (B24); ACS 9.C2.0 (B24); SSDS 10.10.02; SSDS 10.10.04; SSDS 10.10.X; LCS Freedom 3.1 and LCS Independence 6.1 -Certification test for ACS 9.A0.1 (B21) ; SSDS 9.08.05; SSDS 10.10.04 and LCS Freedom 3.1 -Certification Interoperability Risk assessment & Report for ACS 9.A0.1 (B21) ; SSDS 9.08.05 and SSDS 10.10.04 (2) Deep dive analysis and characterization for IFF/Mode 5. (3) Plan to complete C&L and TIC TECHAIDS, normally a near constant yearly demand requirement, also addressed AEGIS Ashore (Romania). This resulted in updates to Interoperability C&L for: -Twenty three (23) Deploying Strike Group Ships (from a database containing 208 U.S. Surface Ships)					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
-Ten (10) Naval Air Squadrons (covering F/A-18s, E-2Cs (only), MH-60Ss (only), EA-6Bs, EA-18Gs, P-3Cs and P-8As) -AEGIS Ashore (Romania). (4) Provide annual deliveries of Preliminary/Final TIC TECHAIDS to: -Fifty seven (57) Carrier Strike Group (CSG) Ships, -Ten (10) Amphibious Ready Group (ARG) Ships, -Eighteen (18) BMD Ships, -Fourteen (14) Forward Deployed Naval Force (FDNF) Ships (2 deliveries) -Thirty three (33) Independent Deploying Ships (CRUDES, CVN, LCS and L-Ship) -Fifteen (15) Littoral Combatant Ships (LCS) -AEGIS Ashore Site (Romania) -Four (4) Fleet Area Control and Surveillance Facility (FACSFAC) sites -Six (6) Maritime Operations Center (MOC) sites (5) Plan to conduct engineering to support two (2) systems Verification and Validation Tests. (6) Provide DWO Stand-Up and initial MBSE model development directed by OPNAV N81 and N9I for the specific mission area capabilities. (7) Provide modeling and documentation support for JCIDS, OPNAV POM process, ASN (RD&A) Acquisition Process. Coordinate Program Executive Office (PEO) requirements allocation process. (8) Participate in the definition of MBSE tool functionality and views based on Echelon I stakeholder requirements. (9)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.					
FY 2018 Base Plans: (1) Conduct three (3) Interoperability Land-Based test events including the following: -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 11.X10.10.05; (LPD 23) and LCS Independence 6.X					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
-Certification Interoperability test for ACS 9.A2.0 (B24) ; ACS 9.C2.0 (B24); and SSDS 10.10.06; and LCS Independence 6.X -Certification Interoperability Risk assessment & Report for ACS 9.A2.0 (B24) ; ACS 9.C2.0 (B24), and SSDS 10.10.06, LCS Freedom 3.1, and LCS Independence 6.1 (2) Complete C&L and TIC TECHAIDS, normally a near constant yearly demand requirement, also addressed AEGIS Ashore. This resulted in updates to Interoperability C&L for: -Twenty three (23) Deploying Strike Group Ships (from a database containing 179 U.S. Surface Ships), -Ten (10) Naval Air Squadrons (covering F/A-18s, E-2Cs, E-2Ds, MH-60Ss, MH-60Rs, EA-6Bs, EA-18Gs, P-3Cs and P-8As) -AEGIS Ashore (Romania, Poland and Pacific Missile Range Facility) (3) Provide annual deliveries of Initial/Draft/Final TIC TECHAIDS to: -Six (6) Carrier Strike Groups (CSG's) Thirty Five (35) Ships -Four (4) Amphibious Ready Groups (ARG's) Eight (8) Ships -Twenty two (22) BMD Ships -Fifteen (15) Forward Deployed Naval Force (FDNF) Ships -Twenty two (22) Independent Deploying Ships (CRUDES, CVN, LCS and L-Ship) -Aegis Ashore Site (Romania, Poland) -Four (4) Fleet Area Control and Surveillance Facilities (FACSFAC's) sites -Six (6) Fleet Maritime Operations Centers (MOC's) sites. (4) Plan to conduct engineering to support two (2) systems Verification and Validation Tests. ***FY 2018 OCO Plans:*** N/A					
Title: Warfare Systems Certification	7.708	4.019	3.768	0.000	3.768
Articles:	-	-	-	-	-
Description: This project provides operational risk assessments to the Fleet Commanders using Objective Quality Evidence (OQE) against set criteria to ensure installation readiness and deployment readiness of warfare systems in Navy surface ships. As directed by COMUSFLTFORCOM/COMPACFLT Inst. 4720.3B, C5ISR					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total

Modernization Policy, and in accordance with NAVSEAINST 9410.2, Naval Warfare System Certification Policy (NWSCP), NAVSEA performs these assessments based on OQE obtained through testimony of subordinate activities and independent modeling, simulation, and testing both for initial assessments and certifications. NAVSEA engineering analyses and risk assessments are developed and staffed for criteria not met. NAVSEA accomplishes these efforts through Warfare Systems Certification Readiness Reviews (WSCRR), Warfare Systems Installation Assessments (WSIA), and Warfare Systems Certification Decisions (WSCD) to support the installation and deployment of warfare systems in Navy surface platforms. The purpose of the WSCRR is to review and approve the Warfare System Certification Plan (WSCP), monitor warfare systems against the WSCP and monitor satisfaction of established criteria to facilitate successful completion of a WSIA and WSCD. The purpose of the WSIA is to provide the Fleet with an early assessment of risk and characterization of the warfare systems maturity and readiness to support sail-away and any shipboard test and training events for New Construction (NC) phase, Refueling Complex Overhaul (RCOH) or lead ships that are test platforms for major modernization effort and/or an assessment to support an authorization for installation of the warfare system(s) for in-service platforms. This allows the Fleet to make informed installation, testing/exercise, and training decisions. The purpose of the WSCD is to provide warfare systems certification including an assessment of risk and characterization of the warfare systems maturity and readiness to support deployment. A NAVSEA certification decision message is released following the WSCD event. An operational risk assessment characterizing warfare systems' maturity and readiness to support the subject ship's deployment is developed from OQE gathered from NWSCP criteria for each decision point meeting/panel. This pillar also ensures that aggregate deficiencies and workarounds do not render the operator ineffective by conducting modeling, simulation, or testing and analysis of all work-arounds documented in Tactics, Techniques and Procedures (TTPs), Capabilities & Limitations (C&L), and Trouble Reports (TR).

FY 2016 Accomplishments:

(1) Conducted Warfare Systems Certifications Events for a subset of twenty (20) criteria for seventy nine (79) ships efforts for seventy four (74) Warfare Systems Certification Events (WSCRRs, WSIAs and WSCDs) and three (3) Warfare Systems Certification Plans (WSCPs) involving CG 47, DDG 51, CVN 68/78, LHA 1/6, LHD 1, LPD 17 LSD 41/49, LCS ship classes and Amphibious Assault Ships.

(2) Assessed emergent risks in Criteria Four in area of Identification Friend Foe (IFF) Mode 5 and emergent combat system baselines. Assessed platform warfare system maturity with Strike Group operations through Strike Group engineering.

FY 2017 Plans:

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
(1) Conduct Warfare Systems Certifications for subset of the twenty (20) criteria for eighty six (86) ships efforts for one hundred forty five (145) Warfare Systems Certifications Events (WSCRRs, WSIAs, and WSCDs) and fifty (50) WSCPs (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. ***FY 2018 Base Plans:*** (1) Conduct Warfare Systems Certifications Events for a subset of twenty (20) criteria for one hundred one (101) ships efforts for approximately one hundred sixty three (163) Warfare Systems Certification Events (WSCRRs, WSIAs, and WSCDs) and fifty six (56) WSCPs for above ship classes. (2) Update the NWSCP and implement revised Naval Warfare Systems Certification Policy. (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. ***FY 2018 OCO Plans:*** N/A					
Title: Warfare Systems Cybersecurity	3.000	2.973	0.973	0.000	0.973
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. Cybersecurity Assessment at the SoS level will entail: (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.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
(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. (3) Conduct an assessment of developmental and operational warfare systems. ***FY 2016 Accomplishments:*** (1) Developed initial Cybersecurity metrics, methodologies and support for Warfare Systems Certifications by providing Cybersecurity assessments in support of WSIAs and WSCDs. (2) Conducted Cybersecurity Assessments on ninety two (92) Ships. (3) Developed five (5) Ship Cybersecurity Certification Plans. Preliminary Cyber Capabilities & Limitations (C&Ls) framework was developed to support tabletop, land-based and pier-side testing; focus was on impacts of HM&E disconnects procedures. (4) Completed initial CYBER TECHAID development and delivery to CTF 70 and CTF 76 ships, in a limited scope, in support of Valiant Shield 2016. ***FY 2017 Plans:*** (1) Refine and align Cybersecurity metrics and assessment methodologies in support of the Naval Warfare Systems Certification Program. (2) Execute Cybersecurity assessment methodology through modeling, simulation or testing in support of the Warfare Systems Certification events. (3) Conduct Cybersecurity Assessments on ninety two (92) Ships. (4) Develop approximately twelve (12) Ship Cybersecurity Plans, Installation Decisions or Certifications. (5) Finalize development of Cybersecurity Assessment Scorecards (CSA) in support of scheduled Warfare Systems Certification WSIA/WSCD Events.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
(6) Initiate the development of Guidebooks for drafting Cyber C&Ls and TECHAIDS enabling follow-on development of Tactics, Techniques and Procedures (TTPs) that incorporate effective Cyber Pre-Planned Responses to known/emerging threats. (7) Continue to develop and expand Cyber C&Ls and TECHAIDs in support of three (3) Strike Groups/ Amphibious Readiness Groups and to include at least one combat system enclave. (8) Integrate Cyber Information Assurance Assessments into C5IMP Baseline Lock Events. ***FY 2018 Base Plans:*** (1) Implement Cybersecurity metrics and assessment methodologies in support of the Naval Warfare Systems Certification Program. (2) Execute Cybersecurity Assessment methodology through modeling, simulation or testing in support of the Warfare Systems Certification events. (3) Conduct Cybersecurity Assessments on eighty-four (84) Ships. (4) Develop approximately twenty (20) Ship Cybersecurity Plans, Installation Decisions or Certifications. (5) Finalize development of Cybersecurity Assessment Scorecards (CSA) in support of scheduled Warfare Systems Certification WSIA/WSCD Events. (6) Continue the development of Guidebooks for drafting Cyber CAPS&LIMS and TECHAIDS enabling follow-on development of Tactics, Techniques and Procedures (TTPs) that incorporate effective Cyber Pre-Planned Responses to known/emerging threats. (7) Continue to develop and expand Cyber CAPS&LIMS and TECHAIDs in support of 5 Strike Groups/ Amphibious Readiness Groups; TECHAIDs will include 5 Maritime Operational Centers (MOCs). (8) Integrate Cyber Information Assurance Assessments into C5IMP Baseline Lock Events. ***FY 2018 OCO Plans:***					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A					
Accomplishments/Planned Programs Subtotals	23.285	26.530	20.274	0.000	20.274

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• OPN 2960: *ICSTF: Integrated Combat System Test Facility*	13.614	8.376	5.019	-	5.019	6.796	6.796	6.603	6.796	0.000	75.932

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: FY 2018 Navy			Date: May 2017
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 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	6.237	2.773	Nov 2015	3.252	Nov 2016	3.036	Nov 2017	-		3.036	Continuing	Continuing	Continuing
C5IMP & Fleet Readiness	C/CPFF	Non-NSWCs : Various	0.000	0.000		0.000		0.240	Dec 2017	-		0.240	0.000	0.240	-
Warfare Systems Certification	WR	NSWCs : DD/Crane	16.530	0.883	Nov 2015	0.719	Nov 2016	0.671	Nov 2017	-		0.671	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 : Various	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: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603582N / *Combat System Integration*	Project (Number/Name) 0164 / *Combat System Integration*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contract Engineering Support	C/CPFF	Gryphon Technology : VA	25.072	5.819	Jan 2016	5.393	Jan 2017	5.034	Jan 2018	-		5.034	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	2.302	0.028	Jan 2016	0.021	Jan 2017	0.020	Jan 2018	-		0.020	0.000	2.371	-
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	0.000	2.456	Jan 2016	3.111	Jan 2017	0.973	Jan 2018	-		0.973	0.000	6.540	-
Capabilities & Limitations	WR	NSWCs : PHD	2.696	2.596	Nov 2015	3.332	Nov 2016	3.110	Nov 2017	-		3.110	0.000	11.734	-
Cybersecurity IA	C/CPFF	CSC : VA	0.000	0.544	Apr 2016	0.000		0.000		-		0.000	0.000	0.544	-
		Subtotal	289.226	15.099		15.828		13.084		-		13.084	-	-	-

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 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	7.433	1.824	Nov 2015	1.657	Nov 2016	1.547	Nov 2017	-		1.547	0.000	12.461	-
DIIAC Engineering and Operations	WR	NSWCs : DD/DN/ SPAWAR	18.083	2.240	Jan 2016	2.196	Jan 2017	2.050	Jan 2018	-		2.050	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	1.242	2.917	Nov 2015	2.724	Nov 2016	2.542	Nov 2017	-		2.542	0.000	9.425	-
Interoperability Cert Assessment	C/CPFF	Non-NSWCS : CNA	0.373	0.876	Jan 2016	0.818	Jan 2017	0.764	Jan 2018	-		0.764	0.000	2.831	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603582N / *Combat System Integration*	Project (Number/Name) 0164 / *Combat System Integration*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Interoperability Cert Assessment	C/CPFF	CSC : Washington, DC	0.140	0.329	Jan 2016	0.307	Jan 2017	0.287	Jan 2018	-		0.287	0.000	1.063	-
Interoperability Cert Assessment	WR	NUWCs : Keyport	0.000	0.000		1.268	Jun 2017	0.000	Jun 2018	-		0.000	0.000	1.268	-
Interoperability Cert Assessment	WR	NSWCs : Crane/ Dahlgren	0.000	0.000		0.880	Jun 2017	0.000	Jun 2018	-		0.000	0.000	0.880	-
Interoperability Cert Assessment	C/CPFF	Various : Various	0.000	0.000		0.852	Sep 2017	0.000	Sep 2018	-		0.000	0.000	0.852	-
		Subtotal	72.434	8.186		10.702		7.190		-		7.190	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	361.660	23.285		26.530		20.274		-		20.274	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603582N / *Combat System Integration*	**Project (Number/Name)** 0164 / *Combat System Integration*

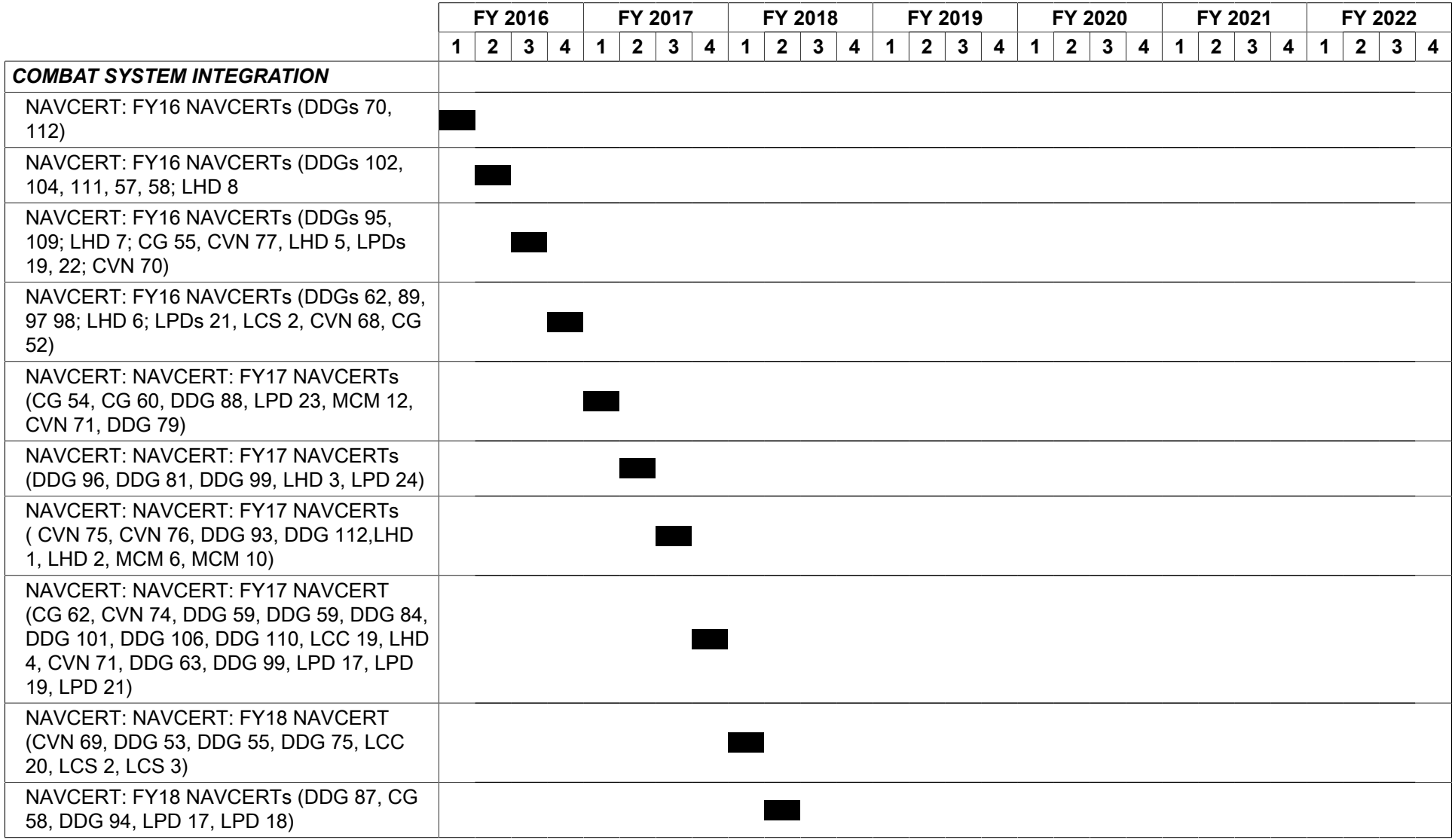


Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603582N / *Combat System Integration*	**Project (Number/Name)** 0164 / *Combat System Integration*

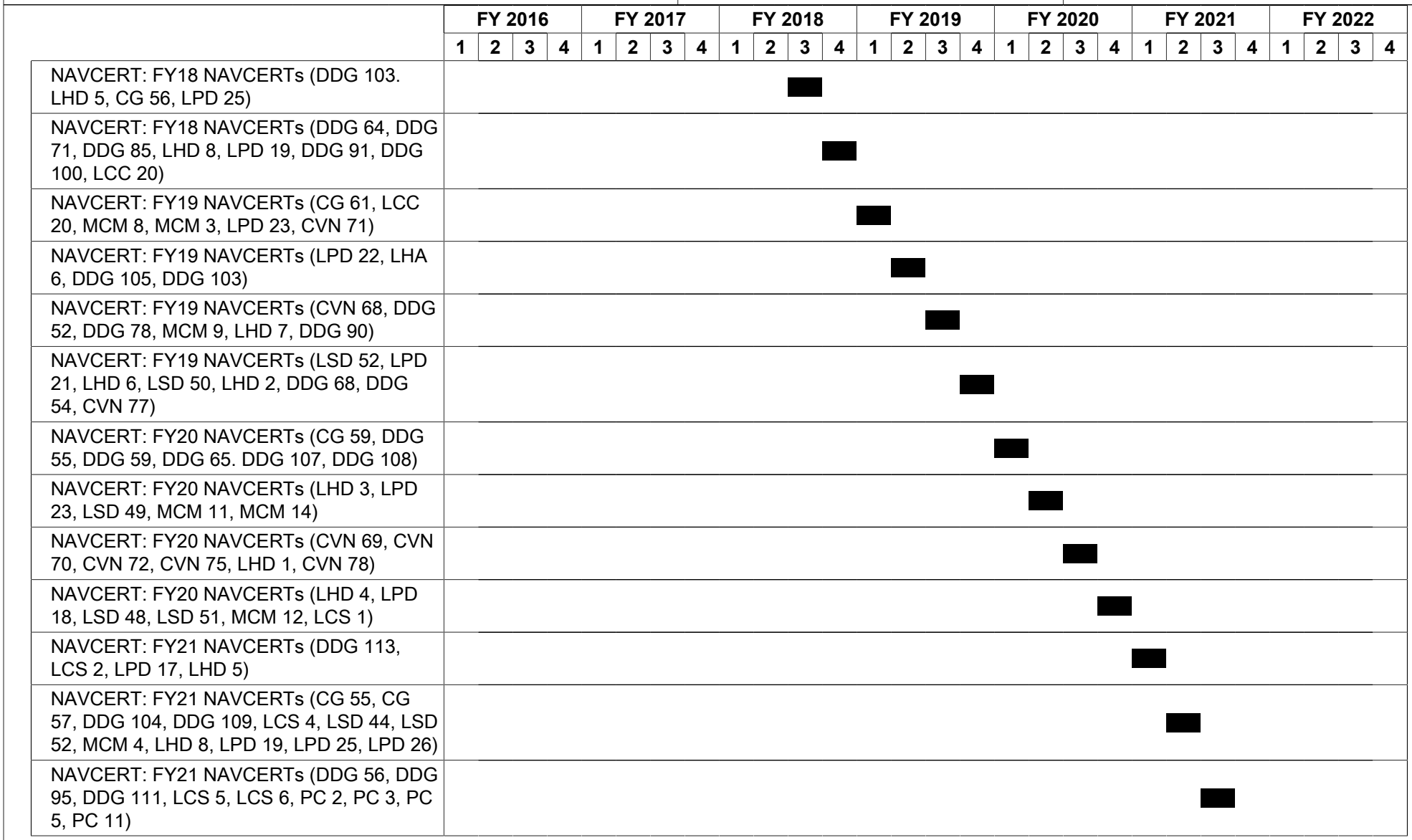


Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603582N / *Combat System Integration*	**Project (Number/Name)** 0164 / *Combat System Integration*

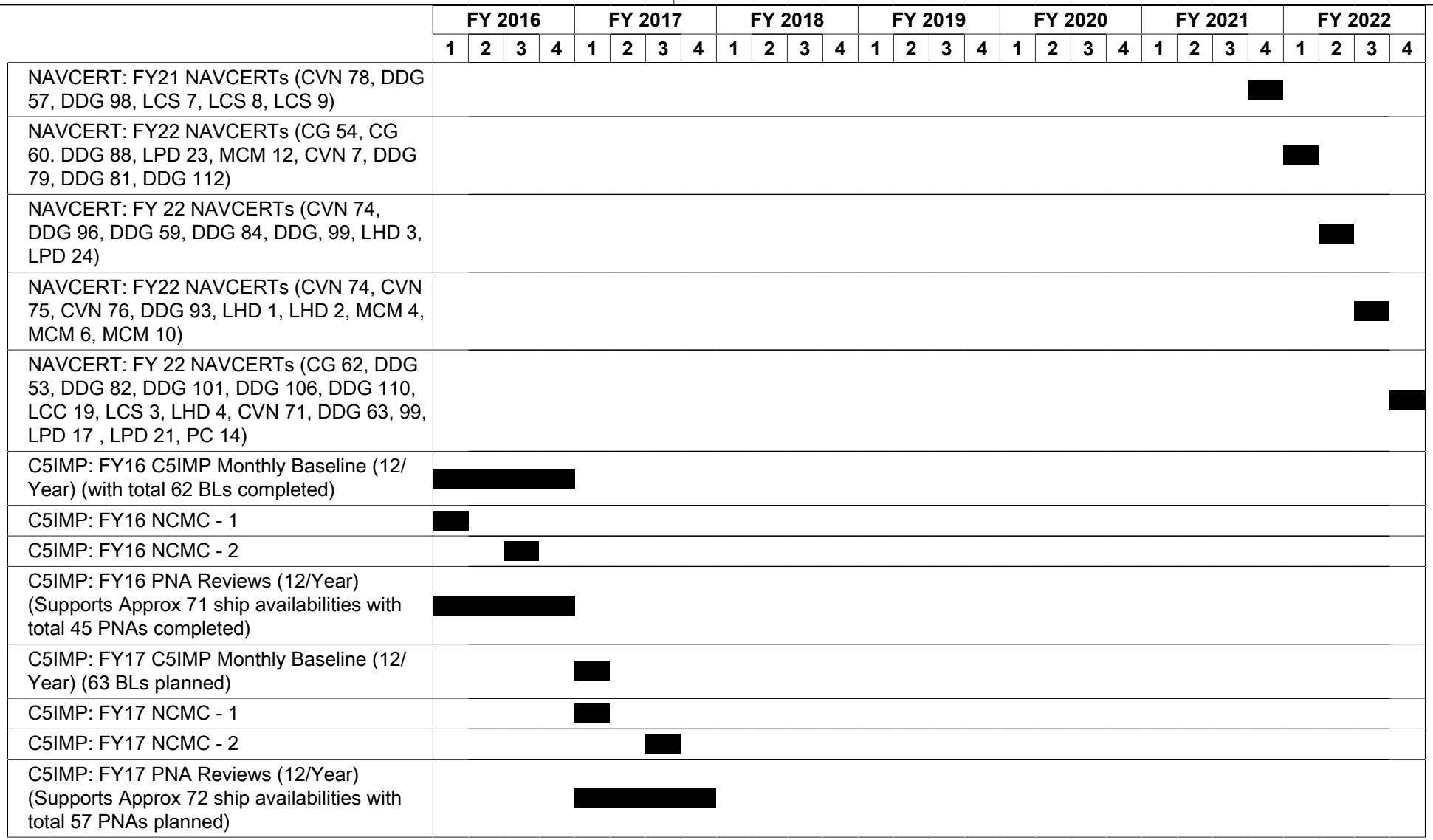


Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603582N / *Combat System Integration*	**Project (Number/Name)** 0164 / *Combat System Integration*

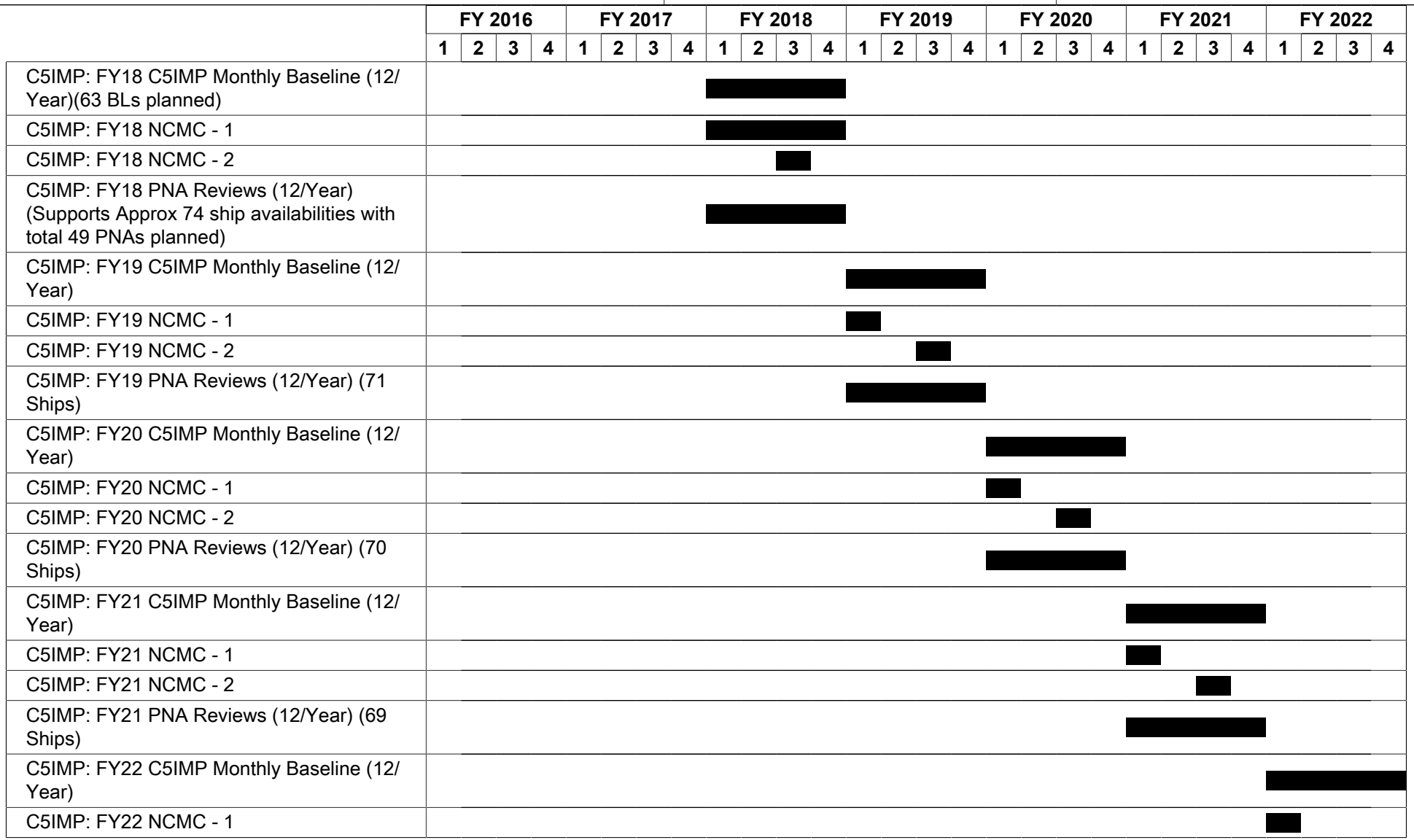


Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603582N / *Combat System Integration*	**Project (Number/Name)** 0164 / *Combat System Integration*

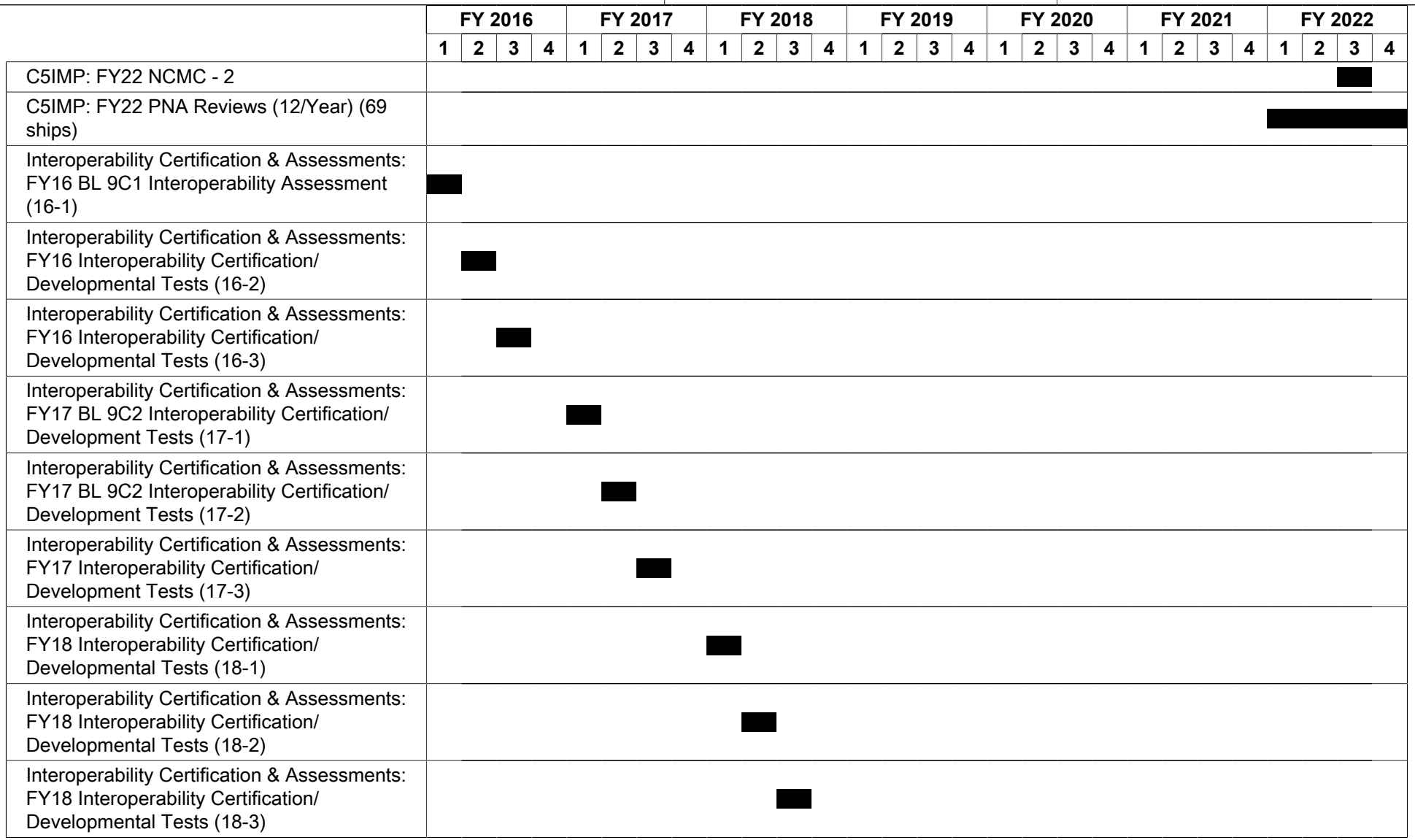


Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603582N / *Combat System Integration*	**Project (Number/Name)** 0164 / *Combat System Integration*

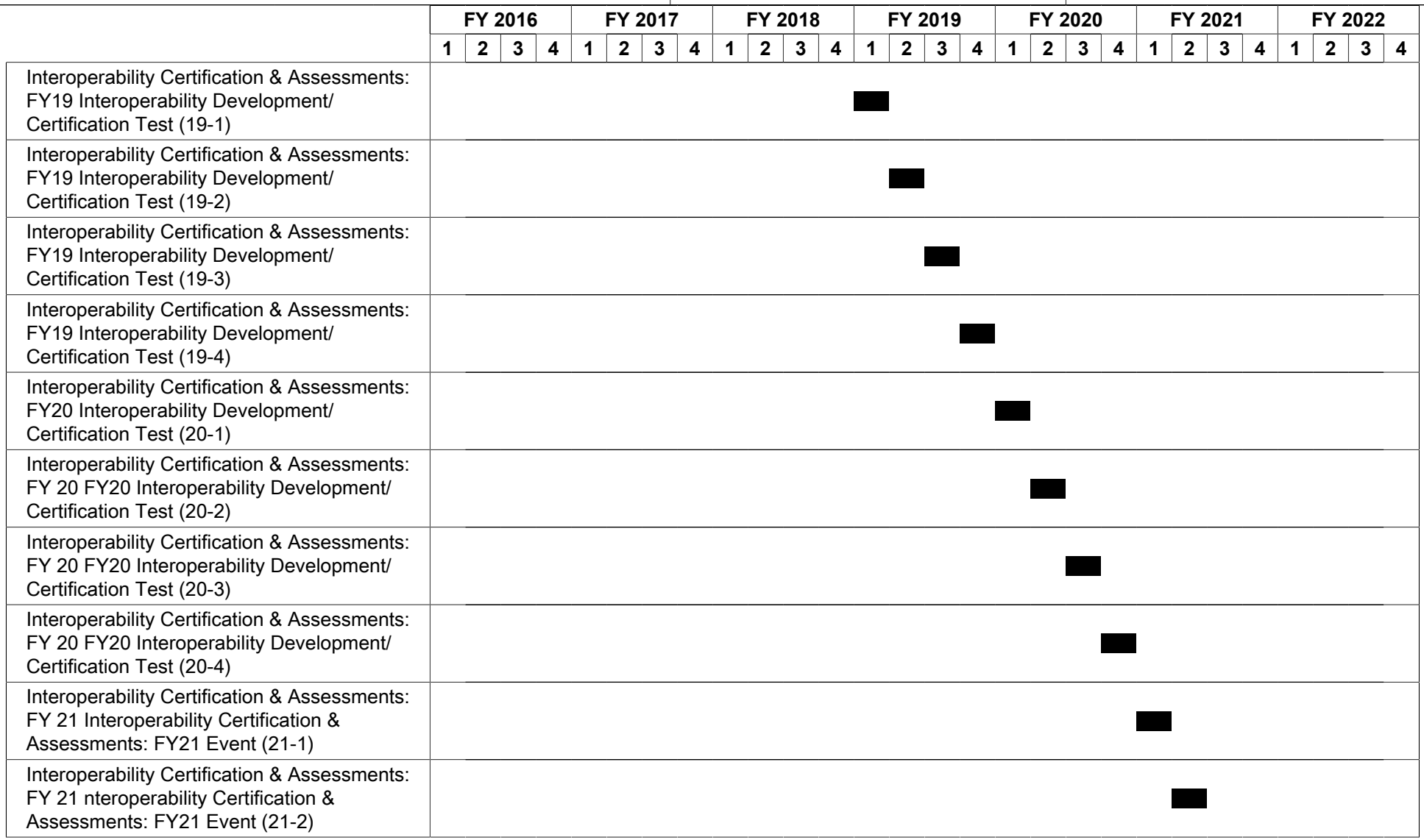


Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603582N / *Combat System Integration*	**Project (Number/Name)** 0164 / *Combat System Integration*

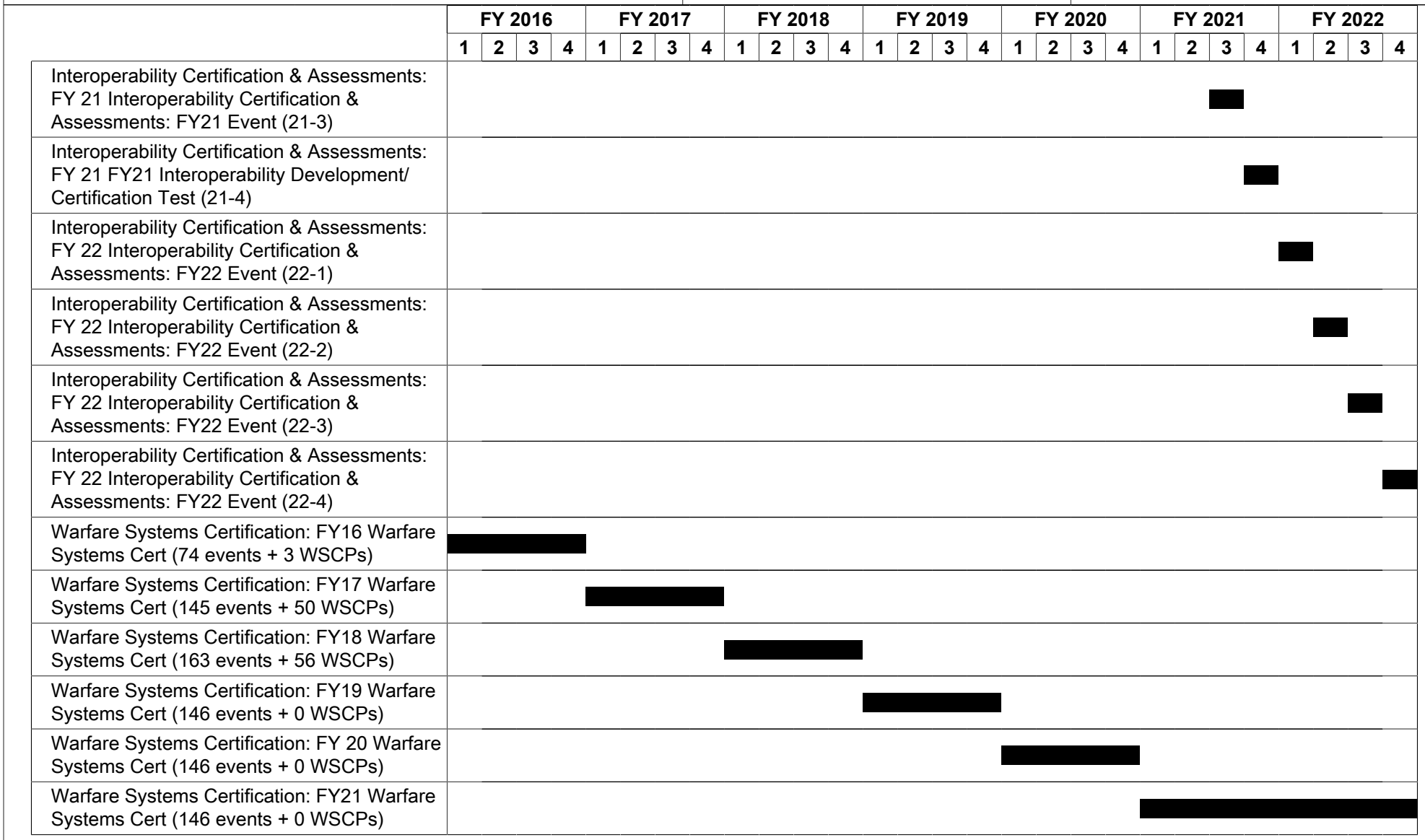


Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603582N / *Combat System Integration*	**Project (Number/Name)** 0164 / *Combat System Integration*

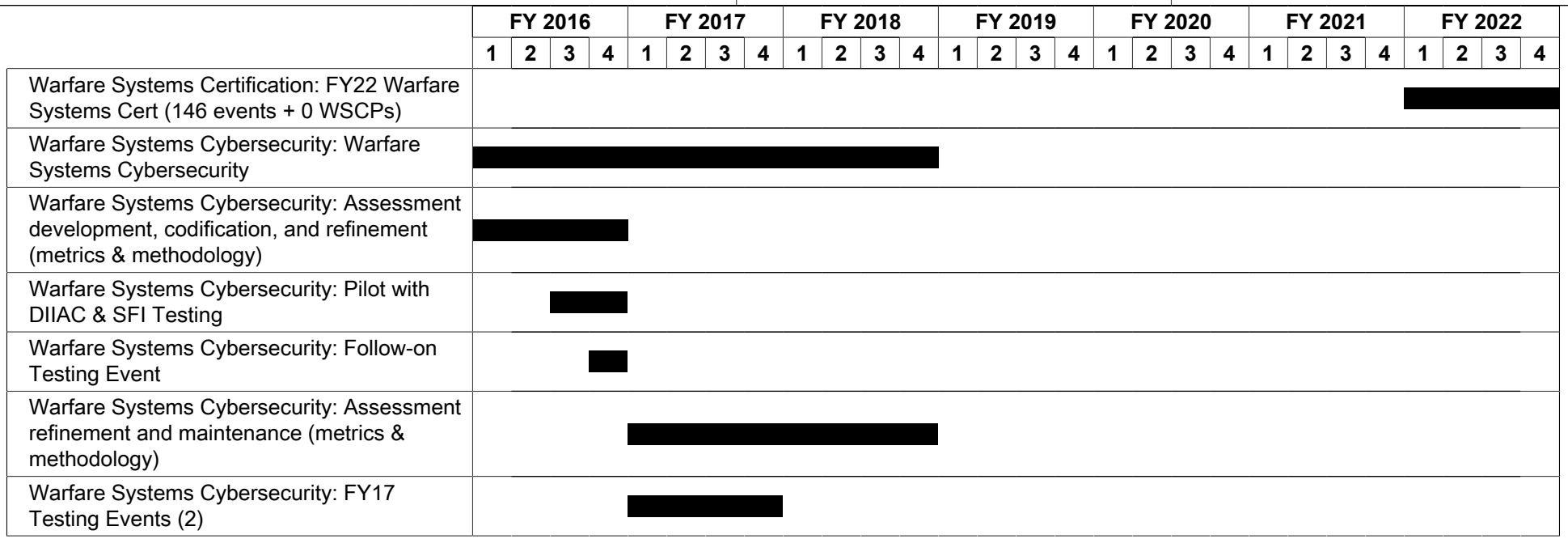


Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603582N / *Combat System Integration*	**Project (Number/Name)** 0164 / *Combat System Integration*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
COMBAT SYSTEM INTEGRATION				
NAVCERT: FY16 NAVCERTs (DDGs 70, 112)	1	2016	1	2016
NAVCERT: FY16 NAVCERTs (DDGs 102, 104, 111, 57, 58; LHD 8	2	2016	2	2016
NAVCERT: FY16 NAVCERTs (DDGs 95, 109; LHD 7; CG 55, CVN 77, LHD 5, LPDs 19, 22; CVN 70)	3	2016	3	2016
NAVCERT: FY16 NAVCERTs (DDGs 62, 89, 97 98; LHD 6; LPDs 21, LCS 2, CVN 68, CG 52)	4	2016	4	2016
NAVCERT: NAVCERT: FY17 NAVCERTs (CG 54, CG 60, DDG 88, LPD 23, MCM 12, CVN 71, DDG 79)	1	2017	1	2017
NAVCERT: NAVCERT: FY17 NAVCERTs (DDG 96, DDG 81, DDG 99, LHD 3, LPD 24)	2	2017	2	2017
NAVCERT: NAVCERT: FY17 NAVCERTs (CVN 75, CVN 76, DDG 93, DDG 112,LHD 1, LHD 2, MCM 6, MCM 10)	3	2017	3	2017
NAVCERT: NAVCERT: FY17 NAVCERT (CG 62, CVN 74, DDG 59, DDG 59, DDG 84, DDG 101, DDG 106, DDG 110, LCC 19, LHD 4, CVN 71, DDG 63, DDG 99, LPD 17, LPD 19, LPD 21)	4	2017	4	2017
NAVCERT: NAVCERT: FY18 NAVCERT (CVN 69, DDG 53, DDG 55, DDG 75, LCC 20, LCS 2, LCS 3)	1	2018	1	2018
NAVCERT: FY18 NAVCERTs (DDG 87, CG 58, DDG 94, LPD 17, LPD 18)	2	2018	2	2018
NAVCERT: FY18 NAVCERTs (DDG 103. LHD 5, CG 56, LPD 25)	3	2018	3	2018
NAVCERT: FY18 NAVCERTs (DDG 64, DDG 71, DDG 85, LHD 8, LPD 19, DDG 91, DDG 100, LCC 20)	4	2018	4	2018
NAVCERT: FY19 NAVCERTs (CG 61, LCC 20, MCM 8, MCM 3, LPD 23, CVN 71)	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 9, LHD 7, DDG 90)	3	2019	3	2019

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603582N / *Combat System Integration*	**Project (Number/Name)** 0164 / *Combat System Integration*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
NAVCERT: FY19 NAVCERTs (LSD 52, LPD 21, LHD 6, LSD 50, LHD 2, DDG 68, DDG 54, CVN 77)	4	2019	4	2019
NAVCERT: FY20 NAVCERTs (CG 59, 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
NAVCERT: FY20 NAVCERTs (CVN 69, CVN 70, CVN 72, CVN 75, LHD 1, CVN 78)	3	2020	3	2020
NAVCERT: FY20 NAVCERTs (LHD 4, LPD 18, LSD 48, LSD 51, MCM 12, LCS 1)	4	2020	4	2020
NAVCERT: FY21 NAVCERTs (DDG 113, LCS 2, LPD 17, LHD 5)	1	2021	1	2021
NAVCERT: FY21 NAVCERTs (CG 55, CG 57, DDG 104, DDG 109, LCS 4, LSD 44, LSD 52, MCM 4, LHD 8, LPD 19, LPD 25, LPD 26)	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 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: FY 22 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: FY 22 NAVCERTs (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
C5IMP: FY16 C5IMP Monthly Baseline (12/Year) (with total 62 BLs completed)	1	2016	4	2016
C5IMP: FY16 NCMC - 1	1	2016	1	2016
C5IMP: FY16 NCMC - 2	3	2016	3	2016
C5IMP: FY16 PNA Reviews (12/Year)(Supports Approx 71 ship availabilities with total 45 PNAs completed)	1	2016	4	2016
C5IMP: FY17 C5IMP Monthly Baseline (12/Year) (63 BLs planned)	1	2017	1	2017
C5IMP: FY17 NCMC - 1	1	2017	1	2017

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603582N / *Combat System Integration*	**Project (Number/Name)** 0164 / *Combat System Integration*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
C5IMP: FY17 NCMC - 2	3	2017	3	2017
C5IMP: FY17 PNA Reviews (12/Year) (Supports Approx 72 ship availabilities with total 57 PNAs planned)	1	2017	4	2017
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	3	2018	3	2018
C5IMP: FY18 PNA Reviews (12/Year) (Supports Approx 74 ship availabilities with total 49 PNAs planned)	1	2018	4	2018
C5IMP: FY19 C5IMP Monthly Baseline (12/Year)	1	2019	4	2019
C5IMP: FY19 NCMC - 1	1	2019	1	2019
C5IMP: FY19 NCMC - 2	3	2019	3	2019
C5IMP: FY19 PNA Reviews (12/Year) (71 Ships)	1	2019	4	2019
C5IMP: FY20 C5IMP Monthly Baseline (12/Year)	1	2020	4	2020
C5IMP: FY20 NCMC - 1	1	2020	1	2020
C5IMP: FY20 NCMC - 2	3	2020	3	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	1	2021
C5IMP: FY21 NCMC - 2	3	2021	3	2021
C5IMP: FY21 PNA Reviews (12/Year) (69 Ships)	1	2021	4	2021
C5IMP: FY22 C5IMP Monthly Baseline (12/Year)	1	2022	4	2022
C5IMP: FY22 NCMC - 1	1	2022	1	2022
C5IMP: FY22 NCMC - 2	3	2022	3	2022
C5IMP: FY22 PNA Reviews (12/Year) (69 ships)	1	2022	4	2022
Interoperability Certification & Assessments: FY16 BL 9C1 Interoperability Assessment (16-1)	1	2016	1	2016

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603582N / *Combat System Integration*	**Project (Number/Name)** 0164 / *Combat System Integration*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Interoperability Certification & Assessments: FY16 Interoperability Certification/ Developmental Tests (16-2)	2	2016	2	2016
Interoperability Certification & Assessments: FY16 Interoperability Certification/ Developmental Tests (16-3)	3	2016	3	2016
Interoperability Certification & Assessments: FY17 BL 9C2 Interoperability Certification/ Development Tests (17-1)	1	2017	1	2017
Interoperability Certification & Assessments: FY17 BL 9C2 Interoperability Certification/ Development Tests (17-2)	2	2017	2	2017
Interoperability Certification & Assessments: FY17 Interoperability Certification/ Development Tests (17-3)	3	2017	3	2017
Interoperability Certification & Assessments: FY18 Interoperability Certification/ Developmental Tests (18-1)	1	2018	1	2018
Interoperability Certification & Assessments: FY18 Interoperability Certification/ Developmental Tests (18-2)	2	2018	2	2018
Interoperability Certification & Assessments: FY18 Interoperability Certification/ Developmental Tests (18-3)	3	2018	3	2018
Interoperability Certification & Assessments: FY19 Interoperability Development/ Certification Test (19-1)	1	2019	1	2019
Interoperability Certification & Assessments: FY19 Interoperability Development/ Certification Test (19-2)	2	2019	2	2019
Interoperability Certification & Assessments: FY19 Interoperability Development/ Certification Test (19-3)	3	2019	3	2019
Interoperability Certification & Assessments: FY19 Interoperability Development/ Certification Test (19-4)	4	2019	4	2019
Interoperability Certification & Assessments: FY20 Interoperability Development/ Certification Test (20-1)	1	2020	1	2020
Interoperability Certification & Assessments: FY 20 FY20 Interoperability Development/ Certification Test (20-2)	2	2020	2	2020
Interoperability Certification & Assessments: FY 20 FY20 Interoperability Development/ Certification Test (20-3)	3	2020	3	2020

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603582N / *Combat System Integration*	**Project (Number/Name)** 0164 / *Combat System Integration*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Interoperability Certification & Assessments: FY 20 FY20 Interoperability Development/ Certification Test (20-4)	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 FY21 Interoperability Development/ Certification Test (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
Warfare Systems Certification: FY16 Warfare Systems Cert (74 events + 3 WSCPs)	1	2016	4	2016
Warfare Systems Certification: FY17 Warfare Systems Cert (145 events + 50 WSCPs)	1	2017	4	2017
Warfare Systems Certification: FY18 Warfare Systems Cert (163 events + 56 WSCPs)	1	2018	4	2018
Warfare Systems Certification: FY19 Warfare Systems Cert (146 events + 0 WSCPs)	1	2019	4	2019
Warfare Systems Certification: FY 20 Warfare Systems Cert (146 events + 0 WSCPs)	1	2020	4	2020
Warfare Systems Certification: FY21 Warfare Systems Cert (146 events + 0 WSCPs)	1	2021	4	2022
Warfare Systems Certification: FY22 Warfare Systems Cert (146 events + 0 WSCPs)	1	2022	4	2022
Warfare Systems Cybersecurity: Warfare Systems Cybersecurity	1	2016	4	2018
Warfare Systems Cybersecurity: Assessment development, codification, and refinement (metrics & methodology)	1	2016	4	2016

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603582N / *Combat System Integration*	**Project (Number/Name)** 0164 / *Combat System Integration*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Warfare Systems Cybersecurity: Pilot with DIIAC & SFI Testing	3	2016	4	2016
Warfare Systems Cybersecurity: Follow-on Testing Event	4	2016	4	2016
Warfare Systems Cybersecurity: Assessment refinement and maintenance (metrics & methodology)	1	2017	4	2018
Warfare Systems Cybersecurity: FY17 Testing Events (2)	1	2017	4	2017

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603582N / *Combat System Integration*	Project (Number/Name) 3312 / *MTMD-Maritime Theater Missile Defense Forum*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3312: *MTMD-Maritime Theater Missile Defense Forum*	23.793	8.735	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	32.528
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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 address coalition 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 constructs surrounding 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-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603582N / *Combat System Integration*	**Project (Number/Name)** 3312 / *MTMD-Maritime Theater Missile Defense Forum*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Maritime Theater Missile Defense Forum (MTMD)	8.735	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-

Description: This project funds participation in Maritime IAMD to promote interoperability with other nations. This project funds participation in Modeling and Simulation (M&S), Battle Management, Command, Control, Communications, Computers and Intelligence (BMC4I), Coalition Distributed Engineering Plant (CDEP), Test Planning and Execution (TPEX), Open Architecture (OA), and Operational Requirements (OR) activities.

FY 2016 Accomplishments:
(1) BMC4I continued engineering analysis and multi-national interoperability gap assessment from Target Architecture test results and developed Target Architectures based on requests for information input from member nations. BMC4I evaluated Recommended Point Solutions and provided recommendations for the implementation in correcting coalition interoperability gaps. BMC4I finalized information exchange requirements in preparation for at-sea demonstrations. BMC4I updated MTMD Coalition Capabilities and Interoperability (CCI) and Systems Tactical Data Links Interoperability (STIR) Reports.
(2) M&S continued analysis of Target Architectures and provided assessments and recommendations to improve information exchange requirements identified by BMC4I. M&S modeled Target Architectures and provided training in support of the 2016 At-Sea-Demonstration.
(3) CDEP conducted hardware-in-the-loop tests and provided assessments and recommendations to improve information exchanges required to conduct at-sea demonstrations. CDEP evaluated at-sea demonstration architecture risks, and updated the Capabilities & Limitations (C&L) document to support the at-sea demonstrations 2015 and 2016.
(4) Open Architecture completed the Open Architecture Radar Interface Standard (OARIS). OARIS was formally adopted by the Object Management Group (OMG) commercial standards body. The OAWG also began the development of the Force Level Open Architecture Technical Standards (FLOATS) by forming the FLOATS Expert Group (FEG). The FEG has held several meetings, including a kick off meeting, to develop the Force Data Model requirements. The OAWG collaborates with BMC4I to ensure alignment with the Target Architecture.
(5) TPEX finalized preparations for MTMD participation as part of at-sea test events occurring in October 2015 and July 2016. The 2016 At-Sea Demonstration included live tracking events and a combination of live and simulated engagements. Integrated Air Defense and Ballistic Missile Defense test scenarios among the nations were conducted held in conjunction with RIMPAC 2016. TPEX also supported preparations of a fleet exercise proposal Formidable Shield 2017 as a follow up to the At Sea Demo held in October 2015.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603582N / *Combat System Integration*	**Project (Number/Name)** 3312 / *MTMD-Maritime Theater Missile Defense Forum*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
(6) Operational Requirements group continued to provide fleet inputs and operator oversight to test and evaluation events. ***FY 2017 Plans:*** 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. FY17 plans stated under the new Program Element. ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	8.735	0.000	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 0605853N: *PU 0149 INTERNATIONAL COOP MANAGEMENT, TECHNICAL AND INTL SUPT*	1.425	2.257	3.638	-	3.638	3.423	3.526	3.652	0.000	Continuing	Continuing

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Quarterly Program Reviews and Baseline Assessments

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603582N / *Combat System Integration*	Project (Number/Name) 3425 / *Digital Warfare Office (DWO) MBE&DT Development*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3425: *Digital Warfare Office (DWO) MBE&DT Development*	0.000	0.000	0.000	4.400	-	4.400	5.500	7.000	7.700	7.700	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

New Project: Digital Warfare Office

The Chief of Naval Operations concurred with the Task Force Netted Navy recommendation to stand up the Digital Warfare Office (DWO) 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 DWO under OPNAV N2N6. In order to develop capability from the top down, the DWO will develop requirements for the system of systems to include all of the associated interoperability requirements. Due to the complexity of this work, the DWO 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 DWO 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: SYSCOM/PEO DWO Support	0.000	0.000	4.400	0.000	4.400
Articles:	-	-	-	-	-
Description: The Digital Warfare Office 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					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603582N / *Combat System Integration*	**Project (Number/Name)** 3425 / *Digital Warfare Office (DWO) MBE&DT Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Model Based Engineering, Technical Design, and Requirements branches in the new Digital Warfare Office (DWO) under OPNAV N2N6. The work scope includes supporting development of a requirements modeling environment to include associated 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. ***FY 2016 Accomplishments:*** N/A ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** 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. 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. 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. Provide engineering inputs to and review NICCs for data architecture consistencies. Explore Machine Learning techniques to support human/machine teaming for decision making. Develop DTBs for PORs under SYSCOM cognizance. Assess DTBs for all SETR events and gate reviews.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603582N / *Combat System Integration*	**Project (Number/Name)** 3425 / *Digital Warfare Office (DWO) MBE&DT Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Provide common infrastructure for MBSE and DTB environments, to include access management, configuration management, and help desk support. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.000	0.000	4.400	0.000	4.400

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

TBD

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603595N *I (U)Ohio Replacement*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	796.804	947.783	700.811	776.158	-	776.158	514.520	447.447	326.007	208.311	Continuing	Continuing
3220: *SBSD Advanced Submarine System Development*	796.804	947.783	700.811	776.158	-	776.158	514.520	447.447	326.007	208.311	Continuing	Continuing

Program MDAP/MAIS Code:
Project MDAP/MAIS Code(s): P444

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 Unit 3220:

The objective of the Sea Based Strategic Deterrent (SBSD) Advanced Submarine System Development project is to design and prepare for construction of the replacement of the OHIO Class SSBN.

PB 18 funding levels align with Milestone B Cost Component Position (CCP)

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	971.393	700.811	757.737	-	757.737
Current President's Budget	947.783	700.811	776.158	-	776.158
Total Adjustments	-23.610	0.000	18.421	-	18.421
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-23.610	0.000			
• Program Adjustments	0.000	0.000	9.630	-	9.630
• Rate/Misc Adjustments	0.000	0.000	8.791	-	8.791

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603595N *I (U)Ohio Replacement*

Change Summary Explanation

Funding: Added additional FY 18 funding to fund program to the Milestone B cost position.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603595N / *(U)Ohio Replacement*	Project (Number/Name) 3220 / *SBSD Advanced Submarine System Development*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3220: *SBSD Advanced Submarine System Development*	796.804	947.783	700.811	776.158	-	776.158	514.520	447.447	326.007	208.311	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: P444

A. Mission Description and Budget Item Justification

The Sea Based Strategic Deterrent (SBSD) Advanced Submarine System Development project supports the COLUMBIA SSBN program. 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 maximize the re-use of existing OHIO systems and new designs from the SEAWOLF and VIRGINIA Classes (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, and Engineering 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 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, 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 SSBN program's Concept Definition, System Definition Prototyping, and Technology Development Efforts supports design, systems engineering, prototyping and vendor qualification activities needed to develop the CMC design, the COLUMBIA whole ship design, and component development. 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 investing 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 will focus on reducing ship construction costs through implementing more effective design features and production methods to produce a more affordable/producible submarine. As part of this effort, alternative contracting strategies are also being examined to include multi-class multiyear procurement (MYP) and Economic Order Quantity (EOQ).

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603595N / *(U)Ohio Replacement*	**Project (Number/Name)** 3220 / *SBSD Advanced Submarine System Development*

Activities for FY 2016 were executed to ensure the first article quad pack prototype of the CMC remains on schedule to support the UK DREADNOUGHT Program. These activities included the start of construction for the first article quad pack in August 2016 with a planned completion in the fall of 2018. 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 requirements, 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. PB 18 funding levels align with Milestone B Cost Component Position (CCP). 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Common Missile Compartment Design and Prototyping	517.316	335.809	268.920	0.000	268.920
Articles:	-	-	-	-	-
FY 2016 Accomplishments: The combination of Common Missile Compartment (CMC) Design and Prototyping and Ship Study and Design represents the required Lead Design Yard (LDY) Shipbuilder effort for the COLUMBIA Class SSBN Program. CMC: This funding was applied 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. A number of efforts were accomplished to include completing CMC Pressure Hull Confirmation model testing, initiating construction of the Forward Confirmation Model, and commenced efforts supporting prototyping of the Missile Tubes (MTs). First Article Quad Pack (FAQP) Design Disclosures, Missile Tube Design Disclosures and CMC System Descriptions were all completed in support of those prototyping efforts. Support of the development of Strategic Weapons Support Systems (SWSS) for the land based test facility in Cape Canaveral, Florida continued. The COLUMBIA Program continued both construction preparation and support activities that enabled start of FAQP construction in August 2016 and continued manufacturing efforts of FAQP missile tubes. These efforts continued to validate MT's to Missile Tube Quad Pack (MTQP) production techniques development, testing, and integration of missile tubes and keel robotic welding techniques that support process certification and generated digital manufacturing data for the prototype FAQP. Specific design efforts included were the continued work on the design and development of the MTs, MTM's and the entire CMC which includes: System Diagrams (100 percent complete), Arrangement Disclosures (93 percent complete and totaled approximately 949 arrangements), and Design Disclosures (27 percent complete with FAQP specific Design Disclosures 100					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603595N / *(U)Ohio Replacement*	**Project (Number/Name)** 3220 / *SBSD Advanced Submarine System Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
percent complete and totaled approximately 269 design disclosures). All CMC Preliminary Hazard Analyses and Safety Requirements Hazard Analyses are complete. Ship Study and Design: This funding was applied to the design, systems engineering, prototyping, and vendor qualification activities needed to execute the schedule for whole ship design, shipbuilder component / technology development for the COLUMBIA submarine. Efforts completed in FY2016 include: finalizing ship control surface geometry, completion the of final phase of Concept of Operations Exercise (COOPEX) to evaluate crew manning and control system/operator interface architecture to evaluate system functionality, arrangements and operator roles and design of the forward and aft ends of COLUMBIA including Rest of Ship (RoS) system integration including the completion of all but one System Description. The COOPEX enabled assessment of the COLUMBIA designs ability to meet the Strategic Weapons System Support (SWSS) Key Performance Parameter (KPP). Additionally, this effort included the completion of approximately 88 percent of engineered component procurement specifications, 96 percent of Systems Diagrams, 35 percent of Arrangements (859 arrangement disclosures). This effort also completed the RoS Design Disclosures (46 design disclosures not including CMC design disclosures) and completed approximately 70 percent of Preliminary Hazard Analyses. Advanced CO2 Removal Unit (ACRU) prototype demonstration performance in a relevant environment to achieve a Technology Readiness Level 6 prior to Milestone. Maintained configuration control for all CMC interfaces with RoS; began ship integration of the Generation 1 Propulsor designs and progressed a Non-Shipboard Prototype to validate the next generation design tool at the shipbuilder; conducted full scale evaluation of Towed Communications Buoy (TCB); tested the Pike and Dolly Varden models at the Acoustic Research Detachment, Naval Surface Warfare Center in Bayview, Idaho; completed material property characterization for the composite material to be used in the Navigation Sonar system window; supported preliminary design of an Out of Autoclave Bow Dome including shock qualification planning and critical design feature testing; tested candidate propulsor bearing materials at the full scale bearing test rig.					
FY 2017 Plans: The combination of CMC Design and Prototyping and Ship Study and Design represents the required LDY Shipbuilder effort for the COLUMBIA Program. CMC: 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 class submarine. Included in this effort is continued development of CMC design products, FAQP Manufacturing Engineering Documents and Work Instructions that support continued construction of the FAQP. Specifically, this effort includes completing 100 percent of CMC Arrangements (approximately 1037 products) and 67 percent					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603595N / *(U)Ohio Replacement*	**Project (Number/Name)** 3220 / *SBSD Advanced Submarine System Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
of CMC Design Disclosures (approximately 650 products) by the end of the FY. Specific planned efforts for 2017 also include continued prototyping of the MTs, continued construction of the prototype FAQP (for ultimate use in the Missile Tube Module) and validation of the Integrated Tube and Hull manufacturing techniques and modular construction techniques for application to the entire MTM installation and test of FAQP manufacturing fixtures; continued manufacturing for the FAQP pressure hull; and support of development of (SWSS) for the land based test facility. Ship Study and Design: LDY efforts increase by approximately 20 percent in FY 2017, driven by a 50 percent increase in labor hours and time related material associated with design disclosure and arrangement development as well as the accompanying engineering analysis. The increase in funding requirements from FY 2016 to FY 2017 supports the 83 percent design completion goal for an FY 2021 Lead Ship construction start and the aggressive 84 month build schedule necessary to support the first strategic deterrent patrol in FY 2031. 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 class SSBN submarine. Specific efforts in FY 2017 include supportability analysis, the completion of 100 percent of engineered component procurement specifications, 70 percent of total Arrangements (approximately 1700 arrangement disclosures not including CMC arrangements), 19 percent of total Design Disclosures (870 design disclosures including CMC design disclosures), and completed development of a Non-Shipboard Prototype to validate the next generation design tool at the shipbuilder. Efforts will also continue towards Safety Requirements Hazard Analyses and maintaining configuration control for all CMC interfaces with RoS and progressing ship integration of the Propulsor design. ***FY 2018 Base Plans:*** The combination of CMC Design and Prototyping and Ship Study and Design represents the required LDY Shipbuilder effort for the COLUMBIA Program. CMC: 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 2018 include the completion of approximately 89 percent of CMC Design Disclosures (890 design disclosures) in support of the MTM build. Specific planned efforts for 2018 also include: continued fabrication of MTs; completion of manufacturing of the FAQP and continued support of development of (SWSS) for the land based test facility, SWS Ashore.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603595N / *(U)Ohio Replacement*	**Project (Number/Name)** 3220 / *SBSD Advanced Submarine System Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
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 total Arrangements (approximately 3800 arrangement disclosures including CMC arrangements), and 58 percent of total Design Disclosures (approximately 2629 design disclosures including CMC design disclosures) supportability assessments. Efforts will also continue towards maintaining configuration control for all CMC interfaces with RoS and progressing ship integration of the Propulsor design. ***FY 2018 OCO Plans:*** N/A					
Title: NAVSEA R&D and Prototyping	166.963	142.608	283.488	0.000	283.488
Articles:	-	-	-	-	-
FY 2016 Accomplishments: This funding applied to the Government combat systems, component, and technology development for the COLUMBIA submarine which is essential to achieving required signatures, maneuverability, combat, and communications capabilities. Accomplishments in FY2016 included: initiating construction of Forward Confirmation Model (FCM), completing CMC Pressure Hull Confirmation model testing to collapse pressure, and commencing efforts supporting prototyping of the MTs, QPs and ultimately the MTM. Efforts completed in FY2016 included finalizing: ship control surface geometry, final phase of COOPEX to evaluate crew manning and control system/operator interface architecture to evaluate system functionality, arrangements and operator roles, and design of the forward and aft ends of COLUMBIA class SSBN including RoS system integration which included the completion of all but one System Description. Another big accomplishment was the prototype demonstrated performance in a relevant environment to achieve a Technology Readiness Level 6 prior to Milestone B. In 2016 the COLUMBIA Program also maintained configuration control for all CMC interfaces with RoS, completed testing of Generation 1 Propulsor designs. Finally, additional accomplishments included: conducting full scale evaluation of (TCB), and testing on the Pike and Dolly Varden models, completed material property characterization for the composite material to be used in the Navigation Sonar system window, supported preliminary design of an Out of Autoclave Bow Dome including shock qualification planning and critical design feature testing. Tested candidate propulsor bearing materials at the full scale bearing test rig. ***FY 2017 Plans:*** This funding applies to the Government combat systems, component and technology development for the COLUMBIA submarine which is essential to achieving required signatures, maneuverability, combat, and					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603595N / *(U)Ohio Replacement*	**Project (Number/Name)** 3220 / *SBSD Advanced Submarine System Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
communications capabilities. Efforts in FY 2017 will include continued work on the Generation 2 Propulsor design (including small and intermediate scale testing) as well as completion of both the fabrication of forward confirmation model and data analysis for CMC Confirmation Model, the Project Arrangement for composite material applications in COLUMBIA SSBNs, and lifecycle testing of Composite Navigation Sonar System and Bow dome shock qualification and detailed design completion. In addition, the COLUMBIA program will provide experiments and simulations to refine platform characterization, maneuvering performance, develop Submerged Operating Envelope (SOE), installation and testing of the High Gain Measurement System and continue Pike testing, commence fabrication and testing of ACRU qualification unit. Specific efforts will also include: continued development, refinement, and delivery of GFI for Non-Propulsion Electronics Systems (NPES), continued assessment of AN/BRR-6 Towed Buoy Antenna (TBA) reliability based updates (including delivery of updated GFI), continued initial systems architecture assessment and development in conjunction with existing submarine classes to deliver increased GFI fidelity, and completion of testing and analysis to support the finalization of control surface design. Finally this effort will continue Government support and oversight of development of approximately 50 engineered components and CMC will continue construction of the prototype FAQP and validation of the Integrated Tube and Hull manufacturing technique as well as applying modular construction techniques to be further applied to the entire MTM. This effort includes the delivery of reliability centered maintenance products and approximately 100 provisioning packages required for ship support and maintenance. Additionally, this effort includes the manufacture of the remaining lead ship COLUMBIA missile tubes that will be incorporated into the prototype MTM. ***FY 2018 Base Plans:*** 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: Generation 2 propulsor design, intermediate scale testing, and hardware manufacturing for LSV testing. The COLUMBIA Program will also begin testing of an array upgrade to support Generation 2 propulsor large scale vehicle testing, and will continue to test the COLUMBIA prototype bearing on the full scale bearing test rig. In addition, preliminary hydrodynamic characterization and submerged operating envelope development will begin development of drawings and procurement specifications for the COLUMBIA sonar bow dome and continued efforts for: development, refinement, delivery of GFI for NPES, assessment of AN/BRR-6 reliability based updates (including delivery of updated GFI), and initial systems architecture assessment and development in conjunction with existing submarine classes to deliver increased GFI fidelity will ensue. Finally this effort will continue Government support and oversight of development of approximately 50 engineered components and CMC will continue preparations for construction of prototype					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603595N / *(U)Ohio Replacement*	**Project (Number/Name)** 3220 / *SBSD Advanced Submarine System Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
missile tube module leveraging lessons from FAQP prototype. FY2017 to FY2018 increases more than inflation due to requirements for lead ship design related to testing component development, prototyping and propulsor manufacturing preparation. ***FY 2018 OCO Plans:*** N/A					
Title: Systems Engineering/Program Management	71.896	11.226	38.520	0.000	38.520
Articles:	-	-	-	-	-
FY 2016 Accomplishments: 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 2016 included: continued review and approval of Arrangements, System Descriptions/ Diagrams, and Design Disclosures in accordance with the Integrated Master Schedule (IMS) via technical oversight, review and Government approval of all LDY developed design products, as well as continuing maintenance planning and design for sustainment activities to ensure Sea Based Strategic Deterrent (SBSD) availability requirements can be met. In addition the COLUMBIA Program also continued to identify and assess platform, shore facilities, and infrastructure characteristics to identify opportunities to reduce program costs and program affordability initiatives in order reduce overall out-year program costs. Specific initiatives included Integrated Product Development Environment (IPDE) process development and validation through prototyping efforts, and identification of candidates for material reuse. Continued program affordability efforts were targeted to achieving potential savings associated with multi-year and/or Economic Order Quantity (EOQ) procurements across submarine classes, investigating the government vs. contractor furnished equipment mix for potential efficiencies, and identifying potential savings associated with continuous missile tube and/or launch tube production runs. The Test and Evaluation Master Plan (TEMP) and the Live Fire Test and Evaluation (LFT&E) Management Plan were drafted and staffed, and other preparations for Acquisition Milestone B, were completed. Finally, the COLUMBIA Class SSBN program completed a progressive Preliminary Design Review in support of Milestone B to demonstrate that the technology development, technical baseline development, and design efforts have sufficiently matured and contain acceptable and manageable risks to allow the program to complete the COLUMBIA design consistent with the approved Capabilities Development Document (CDD) requirements. ***FY 2017 Plans:***					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603595N / *(U)Ohio Replacement*	**Project (Number/Name)** 3220 / *SBSD Advanced Submarine System Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
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 2017 will include: continued review and approval of Arrangements, System Descriptions/ Diagrams, and Design Disclosures in accordance with the Integrated Master Schedule (IMS) via technical oversight, and a review and Government approval of all Lead Design Yard (LDY) developed design products. The TEMP approval is expected in the first quarter. Approval of the alternate Live Fire Test and Evaluation (LFT&E) strategy is also expected in the first quarter and OSD(AT&L) approval of the waiver for COLUMBIA Full Up System Level (FUSL) testing shortly thereafter. The Acquisition Milestone B review is planned for the first quarter. In addition the COLUMBIA program and Commander Operational Test and Evaluation Force will conduct an Early Operational Assessment (OT-B1) which will assess Critical Operational Issues identified in the COLUMBIA TEMP. EOA's identify risks to the successful completion of initial test and evaluation early in the acquisition process so as to support timely corrective action when required. OT-B1 will include review of COLUMBIA design documents and developmental test results but emphasis will be placed on characterizing COLUMBIA's tactical performance against the threat of record via modeling and simulation. OT-B1 will also assess COLUMBIA's cybersecurity. Tabletop platform cyber risk assessments, including deep dives into mission essential systems will continue. Additional cyber controls based on the NAVSEA Cyber Functional Requirement Document (FRD) and will be developed and provided to the shipbuilder and GFE providers. Continued program affordability efforts will target quantifying potential savings associated with multi-year and/or EOQ procurements across submarine classes, investigating the government vs. contractor furnished equipment mix for potential efficiencies, identifying and quantifying manufacturing/producibility improvements and potential savings associated with continuous MT and/or launch tube production runs. The Conventional Launcher Trial Certification Plan for COLUMBIA torpedo and countermeasure launching capabilities will be completed. A common Failure Reporting and Corrective Action System (FRACAS) for use by the COLUMBIA and VIRGINIA class (VACL) programs will be initiated. The FRACAS will maximize the utility of failure data that is of mutual interest, maintain alignment on system evaluation and potential design changes, and minimize the costs to both programs. Ultimately this effort will support investigation of VACL systems with higher than expected failure rates and facilitate improvements and operations and support (O&S) cost reduction, as well as and prevent the recurrence on COLUMBIA Class. Reliability modeling efforts will continue. Reliability Growth plans will be developed for the ARCU and the Thin Line Towed Array Handling System (TLTAHS). ***FY 2018 Base Plans:***					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603595N / *(U)Ohio Replacement*	**Project (Number/Name)** 3220 / *SBSD Advanced Submarine System Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
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; 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 Resource Managers. Tabletop platform cyber risk assessments, including deep dives into mission essential systems, will continue. Cyber Developmental and Operational Test (DT/OT) events will be planned and conducted. FY2017 to FY2018 increases more than inflation due to realigned phasing in the Milestone B cost estimate. OT-B1 will conclude with delivery of Commander Operational Test and Evaluation Force's report in the third quarter. The maturation of the OT-B1 COLUMBIA Survivability M&S 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. ***FY 2018 OCO Plans:*** N/A					
Title: Strategic Weapons Systems Integration	191.608	211.168	185.230	0.000	185.230
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Continued 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 Missile Control Center Module (MCCM), as the SWS system and its subsystems transitioned into detailed-design. The COLUMBIA program continued SWS Test Systems material procurement and builds, test berth/facility modifications, and development of special test vehicles. Furthermore, the COLUMBIA Program continued SWS Ashore test capability development, SWS training capability/requirements development, and final design efforts for the Launch Test Facility (LTF). The program conducted a launcher evaluation test readiness review as well as an integration and test of multiple components at the LTF; continued preliminary Fire Control hardware and software subsystem integration testing, design and development efforts for shipboard SWS Navigation, and systems engineering design efforts related to the COLUMBIA Class SSBN guidance handling carts; conducted mechanical and electrical surface support					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603595N / *(U)Ohio Replacement*	**Project (Number/Name)** 3220 / *SBSD Advanced Submarine System Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
equipment, critical design reviews, and completed build and test of phase 1 of the Inertial Navigation Simulator involving the simulation of subsystem interfaces; and commenced Reentry Body Simulator development. ***FY 2017 Plans:*** The program will continue 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 Missile Control Center Module (MCCM) and SWS system and subsystem detailed design. The COLUMBIA program plans to continue land-based test berth / facility modifications. The COLUMBIA program is continuing SWS Test Systems material procurement and builds and development of special test vehicles; SWS Ashore test capability development; and SWS training capability/requirements development; design and development efforts for shipboard SWS Launcher, Fire Control and Navigation subsystems in preparation for the Critical Design Reviews; systems engineering design efforts related to the COLUMBIA Class SSBN guidance handling carts and procurement of a prototype guidance handling cart along with a plan to initiate the launcher evaluation at the (LTF) and complete Reentry Body Simulator development. ***FY 2018 Base Plans:*** 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 MCCM, and SWS system and subsystem detailed design. The COLUMBIA program will also complete launcher evaluation testing at the LTF as well as land-based test berth / facility modifications. The COLUMBIA program will continue: SWS Test Systems material procurement and builds; development of special test vehicles; SWS Ashore test capability development; SWS training capability/requirements development; systems engineering design related to the COLUMBIA guidance handling carts and procurement of a prototype guidance handling cart. The COLUMBIA program will conduct SWS Launcher, Fire Control and Navigation subsystems Critical Design Reviews. Reentry Body Simulator production will commence. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	947.783	700.811	776.158	0.000	776.158

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603595N / *(U)Ohio Replacement*	Project (Number/Name) 3220 / *SBSD Advanced Submarine System Development*	

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• RDTEN/0603570N/3219: *SBSD Nuclear Technology Development*	419.273	390.326	265.462	-	265.462	190.107	114.010	80.088	60.144	Continuing	Continuing
• RDTEN/0101221N/0951: *Joint Warhead Fuze Sustainment Program*	93.440	111.857	109.730	-	109.730	64.610	32.348	21.473	0.000	0.000	732.275
• OPN/5358: *Strategic Missile Systems Equip*	240.677	215.138	246.221	-	246.221	275.485	278.260	245.166	258.037	Continuing	Continuing
• WPN/1250: *TRIDENT II Mods*	1,089.064	1,103.086	1,143.595	-	1,143.595	1,110.469	1,210.406	1,253.015	1,247.250	Continuing	Continuing
• OMN/1D2D: *Fleet Ballistic Missile*	1,048.056	1,072.385	1,111.862	-	1,111.862	1,186.510	1,213.641	1,226.476	1,257.831	Continuing	Continuing
• SCN/1045: *COLUMBIA Class Submarine*	0.000	773.138	842.853	-	842.853	3,024.236	1,473.898	4,237.852	4,260.920	95,064.200	109,677.097
• MCN/32414106: *Submarine Propulsor Manufacturing Support Facility*	0.000	0.000	0.000	-	0.000	71.930	0.000	0.000	0.000	0.000	71.930

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 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.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603595N / *(U)Ohio Replacement*	**Project (Number/Name)** 3220 / *SBSD Advanced Submarine System Development*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	SS/CPFF	Ship Design Contractor-EB : Groton, CT	425.044	517.316	Oct 2015	335.809	Oct 2016	268.920	Oct 2017	-		268.920	Continuing	Continuing	Continuing
Product Development	WR	NSWC : Carderock, MD	145.437	153.110	Oct 2015	121.628	Oct 2016	106.337	Oct 2017	-		106.337	Continuing	Continuing	Continuing
Product Development	WR	NSWC : Philadelphia, PA	0.000	0.000		0.000		28.091	Oct 2017	-		28.091	0.000	28.091	-
Product Development	WR	NUWC : Newport, RI	14.808	21.045	Oct 2015	10.045	Oct 2016	26.795	Oct 2017	-		26.795	Continuing	Continuing	Continuing
Product Development	Various	NAVSEA : Various	23.921	23.297	Oct 2015	10.935	Oct 2016	122.265	Oct 2017	-		122.265	Continuing	Continuing	Continuing
Product Development	SS/CPFF	ARL Penn State University : State College, PA	0.492	0.492	Oct 2015	0.377	Oct 2016	0.900	Oct 2017	-		0.900	Continuing	Continuing	Continuing
Product Development	SS/CPFF	NGMS : Sunnyvale, CA	35.904	51.420	Oct 2015	46.912	Oct 2016	36.051	Oct 2017	-		36.051	Continuing	Continuing	Continuing
Product Development	SS/CPFF	JHU/APL : Laurel, MD	4.896	3.500	Oct 2015	6.102	Oct 2016	6.394	Jan 2018	-		6.394	Continuing	Continuing	Continuing
Product Development	WR	NUWC : Keyport, WA	0.000	0.000		0.652	Oct 2016	0.648	Oct 2017	-		0.648	Continuing	Continuing	Continuing
Product Development	SS/CPFF	CSDL : Cambridge, MA	3.330	3.266	Oct 2015	2.485	Oct 2016	0.772	Oct 2017	-		0.772	Continuing	Continuing	Continuing
Product Development	WR	NSWC : Corona, CA	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
Product Development	SS/CPFF	LMRMS : Mitchel Field, NY	7.935	19.719	Oct 2015	22.153	Oct 2016	26.526	Oct 2017	-		26.526	Continuing	Continuing	Continuing
Product Development	C/CPFF	EMCUBE : Alexandria, VA	0.951	0.715	Oct 2015	0.693	Oct 2016	0.528	Oct 2017	-		0.528	Continuing	Continuing	Continuing
Product Development	SS/CPFF	LMMSC : Sunnyvale, CA	26.472	25.816	Oct 2015	22.962	Apr 2017	21.030	Oct 2017	-		21.030	Continuing	Continuing	Continuing
Product Development	SS/CPFF	JRC : Washington, DC	0.867	0.796	Oct 2015	1.333	Oct 2016	1.027	Oct 2017	-		1.027	Continuing	Continuing	Continuing
Product Development	C/CPFF	GDMS : Pittsfield, MA	25.291	29.561	Nov 2015	39.481	Oct 2016	27.859	Nov 2017	-		27.859	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603595N / *(U)Ohio Replacement*	**Project (Number/Name)** 3220 / *SBSD Advanced Submarine System Development*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	WR	CNSW : China Lake, CA	9.401	15.194	Nov 2015	25.134	Oct 2016	20.380	Nov 2017	-		20.380	Continuing	Continuing	Continuing
Product Development	SS/CPFF	IEC : Anaheim, CA	1.136	1.023	Oct 2015	0.710	Oct 2016	0.525	Oct 2017	-		0.525	Continuing	Continuing	Continuing
Product Development	WR	NSWC : Dahlgren, VA	3.432	3.722	Oct 2015	5.981	Oct 2016	8.459	Oct 2017	-		8.459	Continuing	Continuing	Continuing
Product Development	SS/CPFF	BAE : Rockville, MD	7.624	10.100	Oct 2015	10.091	Oct 2016	8.341	Oct 2017	-		8.341	Continuing	Continuing	Continuing
Product Development	SS/CPFF	BNA : Huntington Beach, CA	0.894	0.874	Oct 2015	1.449	Oct 2016	1.985	Oct 2017	-		1.985	Continuing	Continuing	Continuing
Product Development	WR	NSWC Crane : Crane, IN	12.205	18.152	Nov 2015	13.715	Oct 2016	13.646	Nov 2017	-		13.646	Continuing	Continuing	Continuing
Product Development	SS/CPFF	SPA : Alexandria, VA	2.711	2.944	Oct 2015	2.477	Oct 2016	2.063	Oct 2017	-		2.063	Continuing	Continuing	Continuing
Product Development	Various	SSP : Various	5.222	4.314	Oct 2015	8.461	Oct 2016	8.096	Oct 2017	-		8.096	Continuing	Continuing	Continuing
		Subtotal	757.973	906.376		689.585		737.638		-		737.638	-	-	-

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Management Support	C/CPFF	Various : Multiple Awards	19.938	21.925	Oct 2015	0.000	Oct 2016	27.047	Nov 2017	-		27.047	Continuing	Continuing	Continuing
Government Management Support	WR	Various: NSWC : Carderock, MD	18.477	19.032	Oct 2015	10.786	Oct 2016	8.272	Oct 2017	-		8.272	Continuing	Continuing	Continuing
Government Management Support	WR	Various: NSWC : Philadelphia, PA	0.000	0.000		0.000		1.471	Oct 2017	-		1.471	0.000	1.471	-
Government Management Support	WR	Various: NUWC : Newport, RI	0.000	0.000		0.000		1.103	Oct 2017	-		1.103	0.000	1.103	-
Travel	WR	NAVSEA HQ : Washington, D.C.	0.416	0.450	Nov 2015	0.440	Nov 2016	0.627	Nov 2017	-		0.627	Continuing	Continuing	Continuing
		Subtotal	38.831	41.407		11.226		38.520		-		38.520	-	-	-

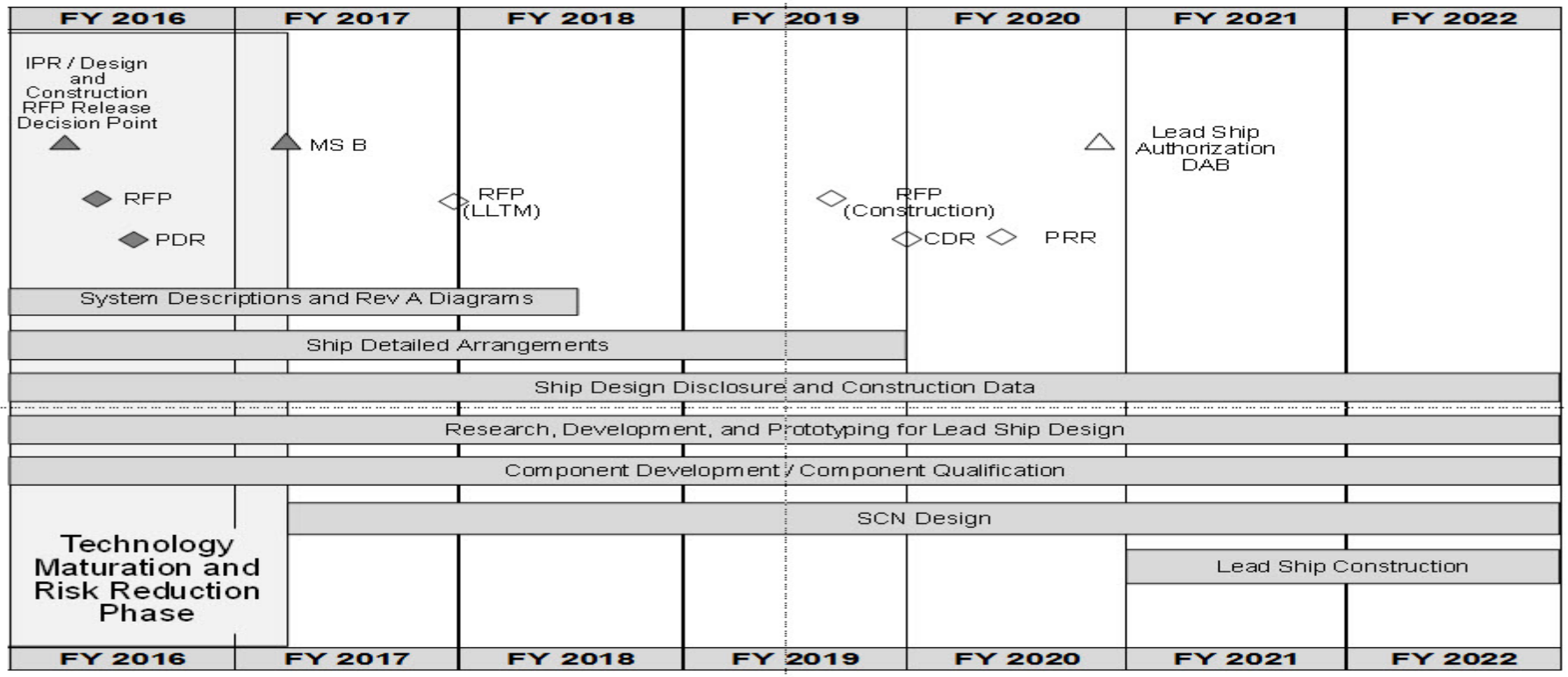
Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603595N / *(U)Ohio Replacement*	Project (Number/Name) 3220 / *SBSD Advanced Submarine System Development*	

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	796.804	947.783		700.811		776.158		-		776.158	-	-	-

Remarks

The listed Award Dates represent the date on which initial obligations occur for the effort.

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603595N / *(U)Ohio Replacement*	**Project (Number/Name)** 3220 / *SBSD Advanced Submarine System Development*



CDR - Critical Design Review
DAB - Defense Acquisition Board
IPR - In Progress Review
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

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603595N / *(U)Ohio Replacement*	**Project (Number/Name)** 3220 / *SBSD Advanced Submarine System Development*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Notes: * Effort began prior to 1st Quarter FY 2016. ** Effort continues past 4th Quarter FY 2022				
System Descriptions and Rev A Diagrams*	1	2016	2	2018
Ship Detailed Arrangements*	1	2016	4	2019
Ship Design Disclosure and Construction Data*, **	1	2016	4	2022
Research, Development, and Prototyping for Lead Ship*, **	1	2016	4	2022
Component Development/Component Qualification* , **	1	2016	4	2022
SCN Design**	1	2017	4	2022
Lead Ship Construction**	1	2021	4	2022

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603596N *I (U)LCS Mission Modules*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	202.035	188.872	160.058	116.871	-	116.871	78.302	52.996	32.560	22.721	Continuing	Continuing
3129: *LCS Mission Package Development*	202.035	188.872	160.058	116.871	-	116.871	78.302	52.996	32.560	22.721	Continuing	Continuing
Program MDAP/MAIS Code: **Project MDAP/MAIS Code(s):** 443												

A. Mission Description and Budget Item Justification

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 MMs provide tailored warfighting capability for one at a time of the three focused mission areas:

MCM - Provides capability to conduct minehunting (detection, localization, classification, identification, and neutralization) and mine sweeping operations for mine threats.
SUW - provides capability to conduct enhanced-range coordinated detection, tracking, classification, identification, and neutralization of groups of attacking, multiple, small boat threats, and to conduct maritime security missions.
ASW - provides capability to detect, classify, localize, and prosecute enemy submarines; counter diesel submarine threats in the littoral shallow waters and their associated deep water approaches; and to provide an escort capability for forces transiting through submarine threat areas.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	203.143	160.058	72.820	-	72.820
Current President's Budget	188.872	160.058	116.871	-	116.871
Total Adjustments	-14.271	0.000	44.051	-	44.051
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-10.000	0.000			
• SBIR/STTR Transfer	-4.271	0.000			
• Program Adjustments	0.000	0.000	42.875	-	42.875

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy					Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*		R-1 Program Element (Number/Name) PE 0603596N *I (U)LCS Mission Modules*			
• Rate/Misc Adjustments	0.000	0.000	1.176	-	1.176

Change Summary Explanation

FY16:

SBIR - $4.271M

Realignment of Condition Based Maintenance Congressional Add - $10.000M

FY18:

Increase in FY18, funds the completion of the ASW Pre-Production test Article, exercise the contract option to develop and deliver the ASW Escort Mission Module (EMM) Integrated Logistics package, development of the training curriculum, procurement of the peculiar support equipment to support land-base testing in FY18 and at sea testing starting in FY19, procurement of testing spares to support Developmental and Operational testing, development of the Technical Data Package (TDP), and certification of the Manufacturing Data Package to support transition to production in FY19.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603596N / *(U)LCS Mission Modules*	Project (Number/Name) 3129 / *LCS Mission Package Development*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3129: *LCS Mission Package Development*	202.035	188.872	160.058	116.871	-	116.871	78.302	52.996	32.560	22.721	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 443

A. Mission Description and Budget Item Justification

Program provides focused war fighting capabilities in littoral mine countermeasures, countering small boat threats, and littoral anti-submarine warfare to provide ensured access to enable the US Joint Force operations in the littorals. A mission package is a combination of warfare mission modules with specialized crew, support equipment, and vehicles including manned helicopters and unmanned maritime systems. They are packaged in a modular fashion so that they can be quickly swapped out pier side. Mission module development includes architectures, interfaces, and integration of mission systems. Mission systems integration also includes the procurement of the first mission packages (MPs) to be used on the Flight 0+ Littoral Combat Ships (LCS). Although the total quantity is under review due to LCS ship and Frigate quantity adjustments, the numerical distribution of mission packages across the LCS/Frigate fleet is not expected to change the Program of Record within the FYDP. The Navy will determine the numerical distribution of MCM, SUW, and ASW MPs across the LCS/Frigate Fleet. The systems to be fielded as part of the MPs and the required RDT&E efforts will not be affected by the LCS and Frigate quantity adjustments. The LCS will be focused-mission ships that have the ability to embark the SUW, MCM, or ASW MPs. The Frigate will be multi-mission ships, with certain SUW and ASW war-fighting capabilities installed.

An incremental development approach to delivering capability allows the continued insertion of mature capabilities throughout the life of the program without the need for modifications to the sea frames. Future 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 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) AQS-20 Mine hunting Sonar
- Coastal Mine Reconnaissance (CMR) Module: Coastal Battlefield Reconnaissance & Analysis (COBRA) and the 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) and the MH-60S Helicopter
- Airborne Mine Neutralization (AMN) Module: Airborne Mine Neutralization System (AMNS), MH-60S Helicopter, and Barracuda
- Unmanned Mine Sweep (UMS) Module: Unmanned Influence Sweep System (UISS) (which is comprised of the MCM USV and the Unmanned Surface Sweep System (US3)

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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- Buried Minehunting (BMH) Module: Knifefish Unmanned Underwater Vehicle (UUV)

The RMH Module uses a MCM USV and an AQS-20 to provide 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.

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 Countermeasure 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.

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 will provide missile coverage for mid-range threats and small boats.

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 Seaframes. 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 Seaframe during mission package development and integration test events at test ranges.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Mine Countermeasures (MCM) Mission Package	31.526	45.355	21.852	0.000	21.852
Articles:	-	-	-	-	-

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
FY 2016 Accomplishments: For the Remote Minehunting (RMH), Near Surface Detection (NSD), and Airborne Mine Neutralization (AMN) Modules, the program resolved hardware Problem Trouble Reports (PTRs) and Trouble Observation Reports (TORs) identified during MCM MP TECHEVAL through development of Advanced Change Study Notices (ACSNs) and Engineering Change Proposals (ECPs). For the MCM MP Coastal Mine Reconnaissance (CMR) Module, integrated COBRA Post Mission Analysis (PMA) workstation into the Mission Package Computing Environment (MPCE) rack and conducted shore side integration events in Mission Package Integration Lab (MPIL) and on LCS. Integrated COBRA software into the MCM Mission Package Application Software (MPAS). Conducted CMR Module Critical Design Review (CDR) and completed development and issued CMR Module specifications. Commenced development of MCM CMR Module logistic products (drawings, Combat System Operating Sequence Systems (CSOSS), Interactive Electronic Technical Manuals (IETMs), Maintenance Requirement Cards (MRCs)). Developed CMR Module Test Objectives and initial Design Reference Mission Profile (DRMP). For the MCM MP Unmanned Mine Sweep (UMS) and Buried Minehunting (BMH) Modules, completed development of the Unmanned Influence Sweep System (UISS) EDM and support contractor testing of the Knifefish Unmanned Underwater Vehicle (UUV). Developed the UMS Module and BMH Module specifications and developed the DRMP. Conducted Knifefish support container Preliminary Design Review, Detailed Design Review, and Integrated Design Review. Developed preliminary Support Container drawings. Developed and tested the Knifefish support container. In support of MCM MP, incorporated the following items into MCM MPAS build 1.7: Correction of software PTRs identified during MCM MP TECHEVAL, integration of MEDAL EA and COBRA software and upgrade MPAS Operating Systems to maintain Information Assurance (IA) compliance. Performed systems engineering (risk management, information assurance, human systems integration, safety), configuration management, and Integrated Logistics Support. Provide collection capability for MP environmental data.					
FY 2017 Plans: MCM MP NSD and AMN Modules (ALMDS, AMNS, MH-60S): Support the declaration of IOC for the MCM aviation systems in Q1 FY2017. MCM MP RMH Module (MCM-USV, and AN/AQS-20 Minehunting sonar): Continue the implementation of Independent Review Team recommendations.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
MCM MP CMR Module (VTUAV, COBRA): Prepare to conduct operational testing of VTUAV/COBRA to support delivery of beach zone mine detection capability in FY 2018 . MCM MP UMS Module (UISS = MCM-USV + US3): Complete integration of UISS into MCM MP and prepare for developmental testing on an LCS platform. For MCM MP BMH Module (Knifefish): Conducted Knifefish Line Mapping Test on USS Independence variant hull. Initiate integration of Knifefhish into MCM MP to include launch and recovery testing from an LCS platform. Continue development of training and training systems for MCM detachments in accordance with Navy Training Support Plan (NTSP). Begin to incorporate UISS and Knifefish into delivered training courses. Perform vendor and interim training in preparation for FY18 deployment. Fund training related detachment Sailor travel for vendor and interim formal training in accordance with Crew Sequencing and Phasing Plans. Update formal curriculum to incorporate findings from program test events, operations and classroom experience. Continue analysis of MCM training to validate effective training delivery and identify changes necessary to deliver training that will achieve Train to Certify KPP. Pilot MCM CAPSTONE Mission Planner, and PMA courses. Achieve Ready for Training (RFT) of MCM CAPSTONE Mine Warfare (MIW), Remote Vehicle Operator (RVO) and Remote Sensor Operator (RSO), Mission Planner, and PMA courses. Pilot and achieve RFT of LCS Common Skills course, and LCS MCM Skills course in the Mission Bay Trainer (MBT) at LCS Training Facility (LTF). Deliver Common Mission Package Trainer software (initial capabilities variant) to the LTF. MCM Train to Certify (T2C) capability will be achieved in FY22 after all systems have been delivered, trainers in place and formal training has been developed and accepted. In support of MCM MP, incorporate the following items into MCM MPAS: Correction of software PTRs identified during MCM MP testing, and UISS software and upgrade MPAS operating systems to maintain IA compliance. Perform systems engineering (risk management, information assurance, human systems integration, safety), configuration management and integrated logistics support. ***FY 2018 Base Plans:*** MCM MP CMR Module (VTUAV, COBRA): Conduct DT/IT of VTUAV/COBRA on Independence variant and achieve IOC.					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
MCM MP UMS Module (UISS = MCM USV + US3): Integrate MCM USV with AQS-20 and UISS into MCM MP and conduct DT and DT/IT on USS Independence variant hull. Start integration of UISS on Freedom variant and conduct LH&R and shipboard integration testing. MCM MP RMH Module (MCM-USV, and AN/AQS-20 Minehunting sonar): Continue integration of MCM USV with MVCS and PMA to support Minehunting. Post Mission Analysis (PMA) work station and application integration into a common equipment rack. In support of MCM MP, incorporate the following items into MCM MPAS build 3.0: Correction of software Problem Trouble Reports (PTRs) identified during MCM MP testing, and integration of Net-Centric Sensor Analysis for MIW (NSAM) and EPMA software. Perform systems engineering (risk management, information assurance, human systems integration, safety), configuration management and Integrated Logistics Support. Continue development of training and training systems for MCM detachments in accordance with NTSP. Continue incorporation of UMS and BMH Modules into delivered training courses. Perform vendor and interim training to support deployed MCM MP and the MCM Minehunting Platform Decision. Fund training related detachment Sailor travel for vendor and interim formal training in accordance with Crew Sequencing and Phasing Plans (CSPP). Continue analysis of MCM training to validate effective training delivery and identify changes necessary to deliver training that will achieve Train to Certify (T2C) Key Performance Parameter (KPP). Begin development of MCM Common Mission Package Trainer software with UMS and BMH Module functionality. ***FY 2018 OCO Plans:*** N/A					
Title: Anti-Submarine Warfare (ASW) Mission Package	56.289	29.541	49.868	0.000	49.868
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Conducted reliability testing of the ASW mission system components and commenced test planning for ASW MP DT, TECHEVAL and IOT&E on LCS 1 variant. Developed testing objectives, conducted performance prediction modeling and prepared test plans to support the start execution of an ASW MP developmental testing in FY17.					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Oversaw and supported execution of shipboard industrial work in accordance with ASW MP Ship Alteration Permanent Change (SHIPALT/PC) Technical Data Package (TDP) and the additional mission module installation Engineering Change Proposals (ECPs). Closed out the Preliminary Design Review (PDR) for the ASW MP Engineering Development Model (EDM) (with weight reduction) by completing engineering efforts to resolve and adjudicate Request for Actions (RFAs). Completed development of the TDP for the ASW MP Critical Design Review (CDR) planned for FY17. Completed development of a draft ASW MP Capabilities Production Document (CPD) and provided engineering, modeling, and analysis support to OPNAV as CPD is staffed though JROC review and approval process. Continued management of PEO LCS Rapid Technology Insertion (RTI) initiative Phase II (Escort Mission Module (EMM)) and completed procurement of Pre-Production Test Article and integration to support continuation of Phase II component and system level validation testing and ASW MP / Ship integration. Continued to develop final ship integration approaches to support LCS Ship Alteration Permanent Change (SHIPALT/PC) TDP development. Completed Light Weight Tow (LWT) torpedo countermeasure mission module wet end and system control software development. Completed procurement of test assets and acquired necessary test spares to support ship integration. Continued planning for development of training and training systems for ASW Mission Module detachments in accordance with Navy Training Support Plan (NTSP). Performed vendor and interim training for ASW developmental test events. Funded training related detachment and replacement Sailor travel for vendor and interim formal training in accordance with Crew Sequencing and Phasing Plans. Continued initial LCS ASW training using SQQ-89 courses, NUWC Land Based Integration Test (LBIT) facility, and NAVAIR Ship Aircraft Integration Laboratory (SAIL). ***FY 2017 Plans:*** Continue EMM development and production of the pre-production test article. Conduct the EMM design reviews and feasibility testing to verify performance.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Conduct mission module and mission package level LBIT, end-to-end (E2E) 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 TECHEVAL. Continue planning for ASW MP IOT&E. Support EDM Lightweight Tow/LCS integration. Prepare Modular Testing Vehicle (MTV) torpedoes to support in-water testing of integrated Support Lightweight Tow DT/OT at Canadian Fleet Maritime Experimental Testing Range (CFMETR). Award AN/SLQ-61 LRIP contract. Continue development of training and training systems for ASW Mission Module detachments in accordance with NTSP. Update ASW Front End Analysis (FEA) and Job Duty Task Analysis (JDTA) to reflect ASW Rapid Technology Insertion (RTI) system selection. Perform vendor and interim training for ASW developmental test events. Fund training related detachment Sailor travel for program test events and Crew Sequencing and Phasing Plan (CSPP) required training. Begin development of formal curriculum and incorporate findings from program test events, operations and classroom experience. Continue analysis of training to validate effective training delivery and identify changes necessary to deliver training that will achieve Train to Certify (T2C) Key Performance Parameter (KPP). Continue development of ASW Training and trainers. Continue initial LCS ASW training using SQQ-89 courses, NUWC Land Based Integration Test facility (LBIT), and NAVAIR Ship Aircraft Integration Laboratory (SAIL). Commence development of Common Mission Package Trainer (CMPT) ASW software for use in LCS ASW MM CAPSTONE courses at LCS Training Facility (LTF). SUW Train to Certify (T2C) capability will be achieved in FY20 after all systems have been delivered, trainers in place and formal training has been developed and accepted. Continue Escort Mission Module acoustic processing, Aviation integration support software and Command and Control software development to support software certification and follow on shipboard testing. Initiate safety analysis of the ASW EDM systems developed under the RTI initiative and conduct integration safety analyses on the Independence variant. ***FY 2018 Base Plans:*** Complete EMM development. Exercise the integration and testing CLIN on the RTI contract in support of ship or Mission Module integration, testing, Validation and Verification (V&V), certification and delivery. Finalize safety analysis of the ASW systems for risk of production equipment. Continue detailed integration safety analyses on the Independence variant. Participate in ASW MP test events on board Freedom and					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Independence Variants in order to verify safety requirements. Conduct ASW MP Weapon System Explosives Safety Review Board (WSESRB) for concurrence with ASW MP deployment. Finalize FY19 testing objective for the Performance Prediction modeling and conduct ASW MP level end-to-end (E2E) integration testing at the Land Based Integration Test (LBIT) facility and start performance validation testing in support of ASW MP TECHEVAL/OPEVAL. Support ASW Escort Mission Module (EMM) shipboard mods on Independence variant in preparation for MP embarkation and DT. Work with shipbuilder to ensure work packages are developed and approved for execution in FY18. Develop FY19 testing objectives, conduct performance prediction modeling and prepare test plans to support the execution of an ASW MP operational testing of the ASW MP. Conduct Integration testing of AN/SLQ-61 on LCS Freedom variant. Testing to be performed aboard LCS platforms at the Canadian Fleet Maritime Experimental Testing Range (CFMETR) against instrumented MTV torpedoes. While at CFMETR conduct ship radiated noise measurement testing, and wake profiling. Integration Test facility (LBIT), and NAVAIR Ship Aircraft Integration Laboratory (SAIL). Deliver initial Common Mission Package Trainer (CMPT) ASW software for LCS ASW MM CAPSTONE courses. Train to Certify (T2C) capability will be achieved in FY20 after all systems have been delivered, trainers in place and formal training has been developed and accepted. Develop the production transition plan and conduct factory acceptance testing at the Contractor facility of the Pre-Production Test Article. ***FY 2018 OCO Plans:*** N/A					
Title: Surface Warfare (SUW) Mission Package	56.460	42.552	17.647	0.000	17.647
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Conducted reliability testing of the Surface-to-Surface Missile Module (SSMM).					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Continued developmental testing to categorize modifications to the current MPAS baseline. Continued modifications to MPAS to support SSMM development. Completed planning and executed the SSMM environmental confidence level testing. Executed engineering and developmental testing of SSMM. Continued development of the detailed launcher design that supports the SSMM concept. Find/Fix/Repair technical issues associated with SSMM and MPAS identified during STF and DT events. Continued development of training and training systems for SUW Mission Module detachments in accordance with Navy Training Support Plan (NTSP). Performed vendor and interim training for formal SUW test events. Funded training related detachment and replacement Sailor travel for vendor and interim formal training in accordance with Crew Sequencing and Phasing Plans (CSPP). Updated formal curriculum to incorporate findings from program test events, operations and classroom experience. Piloted SUW CAPSTONE Mission Package Coordinator (MPC) and Gun Console Operator (GCO) courses. Piloted and achieved Ready for Training for MK50 Gun Mission Module (GMM) Operations and Maintenance differences course. Continue analysis of SUW training to validate effective training delivery and identify changes necessary to deliver training that will achieve Train to Certify (T2C) Key Performance Parameter (KPP).					
FY 2017 Plans: Complete development and subsystem validation testing of the Surface-to-Surface Missile Module (SSMM) in support of a Technical Data Package (TDP) delivery for production in FY18. Complete software modifications and safety assessments for vertical launch integration of the Longbow Hellfire (LBHF) missile into the SSMM. Complete delivery of Engineering Development Models to support formal shipboard testing aboard Freedom and Independence Class. Continue development of Mission Package Application Software (MPAS) with Helo Support Function (HSF) to include VTUAV software integration and deliver MPAS Build 2.4.4 to support formal shipboard DT/IT and IOT&E on Freedom and Independence variants in FY17/FY18. Support development of SSMM logistics documentation and conduct initial crew training for shipboard test events and FY18 deployments. Conduct SSMM Critical Design Review (CDR). Develop FMECA to the functional level to support the SFR with updates to the system level for Preliminary Design Review and to the LRU/SRU level for CDR. Level of Repair Analysis modeling to support PDR with an update for CDR. Mission Module Maintenance Plan to be delivered as a Maintenance Concept report for PDR with a complete plan covering Organizational-Level maintenance only to support CDR. Maintenance Task Analysis (MTA) as required to identify O-level maintenance requirements. Detail Task Analysis (DTA) as required to outline and analyze each identified O-level maintenance task. Support Equipment Requirements Documents (SERDs) to document common and unique support equipment requirements for O-					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
level identified during task analysis. O-level Technical Manual development utilizing the output of supportability and maintenance analysis tasks, hardware engineering drawings and specifications, and any existing technical documentation. These manuals must be compatible with and consistent in style, content, and format to the existing SUW technical manuals. Continue update of SUW Supportability Assessment and Gap Analysis Reports on an annual basis. Provide initial provisioning technical data at sufficient level to support O-level deployed maintenance activities. Develop SUW MP PMS to include SSMM equipment. Conduct combat system certification, MP certification, obtain WSESRB/SSSTRP approvals, and IA approvals for initiation of Developmental testing. Conduct SSMM Structural Test Fire (STF) onboard Freedom Variant. Begin Developmental Testing on Freedom Variant. Complete all Integrated Logistics Support (ILS) products in support SSMM IOC. Deliver all Interactive Electronic Technical Manuals (IETM) to support SSMM normal and casualty modes, and SSMM installation and employment. Complete and deliver all Maintenance Requirements Cards (MCR). Conduct ILS certification. Deliver all Provisioning Documentation to include Allowance equipage Lists (AEL) and Allowance Parts Lists (APLs). Procure all testing spares required to support SUW Increment III TECHEVAL and IOT&E. Continue development of training and training systems for SUW Mission Module detachments in accordance with NTSP. Perform vendor and interim training for formal SUW test events. Fund training related detachment Sailor travel for vendor and interim formal training in accordance with CSPPs. Update formal curriculum to incorporate findings from program test events, operations and classroom experience. Continue analysis of SUW training to validate effective training delivery and identify changes necessary to deliver training that will achieve Train to Certify KPP. Begin development of SUW Skills training for use at LTF Mission Bay Trainer. Develop curriculum and system changes to support incremental capability fielding plan. Begin integration of VTUAV into SUW MP MPAS. ***FY 2018 Base Plans:*** Complete formal shipboard testing (DT/IT, IOT&E) aboard Freedom Class only. Conduct post-test Find, Fix, and Repair (FFR) of SSMM assets and resolve Mission Package Application Software (MPAS) Computer Change Program Requests (CPCR).					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Finalize SSMM logistics documentation and conduct crew training for shipboard test events and deployment. Complete delivery of the Surface-to-Surface Missile Module (SSMM) Technical Data Package (TDP) to support transition to production and Production Readiness Review (PRR). Perform vendor and interim training for formal SUW test events. Update formal curriculum to incorporate findings from test events, operations and classroom experience. Begin development of SUW Skills training for use at LTF Mission Bay Trainer. Develop curriculum and system changes to support incremental capability fielding plan. ***FY 2018 OCO Plans:*** N/A					
Title: Command, Control, Communication, Computers, Collaboration and Intelligence (C5I)	9.639	8.554	10.082	0.000	10.082
Articles:	-	-	-	-	-
FY 2016 Accomplishments: MPCE v1.9 - Continued hardware tech refresh activities at MP development sites and ship set deliveries for ships in accordance with Ship Project Directives (SPDs); - MPS/MPOE, Developed new software release of MPS/MPOE for MPAS integration on as required basis. Continued integration of Common Software Architecture (CSA) into the ASW MP. Continued evolving the MPCE software architecture to a Service Oriented Architecture (SOA), MPCE 1.9.x. Completed MPCE 1.9.x System Subsystem Spec (SSS) documenting the merge of CSA SSS requirements with the MPCE SSS. Conducted tech refresh/insertion studies needed to sustain incremental MPCE capability upgrades. Identified technology refresh cycles and the hardware required to meet current requirements while addressing obsolescence and future MPCE SSS requirements. MVCS v1.2.0, develop software changes to support UISS and SMCM UUV integration and complete definition of requirements to integrate High Frequency Ground Wave (HFGW) radio. Common Mission Package Trainer (CMPT). Completed MCM Increment 1 and SUW increment 1 integration with LCS-1 and LCS-2 Combat Management System Trainers and commenced standalone and integrated team training at LTF for MCM and SUW detachments. Prepared CMPT development lab for transition to MPCE 1.9 hardware specification and transition to Windows 10 software to meet cyber-security requirements. ***FY 2017 Plans:*** Mission Package Computing Environment Conduct tech refresh of MPCE 1.9 hardware in support of continuing Mission Module developmental efforts. Conduct MPCE groom and TOR remediation activities to support shipboard testing of MCM and SUW Mission Modules (Freedom Variant).					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Common Mission Package Trainer (CMPT). Continue incremental update to reflect MCM CMR capability and SUW SSMM capability. Integrate updated software with LCS-1 and LCS-2 Combat Management System Trainers and conduct standalone and integrated team training at LTF for MCM and SUW detachments. Transition CMPT development lab to MPCE 1.9 hardware specification and Windows 10 software to meet cyber-security requirements. Prepare CMPT Development lab for transition to ASW Escort Mission Module (EMM) hardware and software specifications.					
FY 2018 Base Plans: Mission Package Computing Environment: Conduct MPCE Modernization, conduct Formal SETR MPCE 1.9.x CDR and Factory Training. Conduct MPCE grooms to support MCM, ASW and SUW MP Test events. Complete transition to the common software baseline from MPOE/MPS with MCM, SUW, and ASW. Develop an Unmanned System Common Control to control UISS and monitor Knifefish. Finalize Program Protection Plan. Conduct Logistics Demonstration (LOGDEMO) to validate the effectiveness and execution performance of the delivered logistics products. Multi Vehicle Communications System: Complete the design, development and test of MVCS 1.3, resulting in an ECP and SCD package. Conduct tech refresh/insertion studies needed to sustain incremental MVCS capability upgrades. Support integration of the communication package into Knifefish and UISS. Perform technical upgrade of MVCS 1.1 and 1.2 Provide assistance for Knifefish, UISS, and MCM-USV upgrades required for MVCS. Continue development of logistics products for MVCS 1.3					
Common Mission Package Trainer (CMPT). Continue incremental update to reflect MCM CMR capability and SUW SSMM capability. Integrate updated software with LCS-1 and LCS-2 Combat Management System Trainers and conduct standalone and integrated team training at LTF for MCM and SUW detachments. Transition CMPT development lab to include ASW Escort Mission Module (EMM) hardware and software specification.					
FY 2018 OCO Plans:					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A					
Title: System Engineering and Program Acquisition	34.958	34.056	17.422	0.000	17.422
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Overarching SE Continued to Develop and implement process to track lead/lag SE Metrics to include requirements, RTVM, and SRLs Continued to implement a Technical Performance Measure (TPM) Plan, Continued to Assist in TOR adjudication and prioritization Continued to Standardized and improved Reliability, Availability and Maintainability (RAM) data collection Continue to Implement the Maintained Failure Reporting, Analysis, and Corrective Action System(FRACAS) and Failure Review Boards (FRBs) Modeling and Simulation strategic plan to support performance prediction, validation of Test & Evaluation plans, and/or training and stimulation and simulation efforts. Configuration Management: Continued to implement the Configuration Management Plan (CMP) to differentiate between developmental and product baselines and look to streamline CCB processes Safety/ESOH risk/hazard analysis and mitigation tracking Conducted Safety Risk Assessment of new development technologies such as Common Software Architecture (CSA) Continued to implement the Hazardous Materials Management Plan (HMMP) Reliability, Maintainability, and Availability Continued the systematical management and elimination of failures and failure modes through identification, classification, analysis and removal or mitigation. Continued the refinement of the MCM, SUW and ASW RAM models by integration actual data collected during mission package TECHEVAL, Initial Operational Test and Evaluation (IOT&E) and Fleet operations and conduct multiple sensitivity analysis to quantify the effect of alternate sparing philosophies (i.e., more onboard spares, complete spare system, etc.) based on mission module availability. Conducted root cause analysis and recommended corrective action on all discovered failure modes. Continued utilizing FRACAS to feedback MCM, SUW and ASW product and process improvements to the Systems Engineering and ILS organizations. Drafted RAM-C Analysis Reports for new and updated analysis. Updated RAM-C Rationale Report as required to reflect the new and updated analysis.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Test and Evaluation Continued planning and executing the LCS Mission Module test program. This included additional planning, testing, data analysis, and reporting for the missile in a module to be installed in LCS weapons zone. Conduct National Environmental Policy Act (NEPA) and environmental planning and coordination to support DT/ TECHEVAL/OT/FOTE. Conduct and Support Certification Test and Evaluation to include software certification/ assessment testing, reporting, and events such as MPRAs, MRAs, MRRs, Test Readiness Reviews, WSESRB, etc. in order to support test events and Fleet deployment upon completion of the IOT&E. Perform Mission Package - Seaframe Integration and Aviation Integration. Seaframe Integration provided services that supported the successful integration of the MCM, SUW, and ASW Mission Packages into both variants of LCS seaframes. Aviation Integration provided services that supported the successful integration of aviation assets of the MCM, SUW, and ASW Mission Packages into both variants of LCS seaframes. ***FY 2017 Plans:*** Continue PM efforts: 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. Continue to provide overarching System Engineering oversight for all LCS Mission Modules. Continued to Develop and implement process to track lead/lag SE Metrics to include requirements, RTVM, and SRLs, continue iplementation of Technical Performance Measure (TPM) plans and continue to implement Model Based System Engineering strategies on critical MP interfaces identified during ASW SFR and SSMM assessments. Continue to assist in TOR adjudication and prioritization. Continue to Implement the Failure Reporting, Analysis, and Corrective Action System (FRACAS) and Failure Review Boards (FRBs) Supported the following Major SE Events: Buried Minehuting Mission Module PDR and CDR, Unmanned Mine Sweeping Mission Module PDR and CDR, Full MCM MP Capability System Requirements Review (SRR), and SUW MP SSMM CDR. Continue the systematical management and elimination of failures and failure modes through identification, classification, analysis and removal or mitigation. Continue the refinement of the MCM, SUW and ASW RAM models by integrating actual data collected during mission package TECHEVAL, Initial Operational Test and Evaluation (IOT&E) and Fleet operations and conduct multiple sensitivity analysis to quantify the effect of					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
alternate sparing philosophies (i.e., more onboard spares, complete spare system, etc.) based on mission module availability. Conduct root cause analysis and recommend corrective action on all discovered failure modes. Continue utilizing FRACAS to feedback MCM, SUW and ASW product and process improvements to the Systems Engineering and ILS organizations. Provide shipboard Integration services that supported the successful integration of the MCM, and SUW Mission Packages into both variants of LCS seaframes. Aviation Integration provide services that support the successful integration of aviation assets of the MCM, SUW, and ASW Mission Packages into both variants of LCS seaframes. Training Management Coordinate efforts of four training Integrated Project Teams (IPTs): MCM, SUW, ASW, and Common systems. Developed programmatic documentation updates for Cost Analysis Requirements Document (CARD), Manpower Estimate Report (MER), and Three NTSPs: MCM, ASW and SUW. Continue to integrate LCS MM program training with LCS platform program training, and support Surface and Expeditionary Warfare Training Council (SEWTC) periodic training execution review and annual POM issue prioritization.					
FY 2018 Base Plans: Continue PM efforts: 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. Continue to provide overarching System Engineering oversight for all LCS Mission Modules. Continue to Develop and implement process to track lead/lag SE Metrics to include requirements, RTVM, and SRLs, continue implementation of Technical Performance Measure (TPM) plans and continue to implement Model Based System Engineering strategies on critical MP interfaces identified during ASW SFR and SSMM assessments. Continue to assist in TOR adjudication and prioritization. Continue to Implement the Failure Reporting, Analysis, and Corrective Action System (FRACAS) and Failure Review Boards (FRBs) Reliability, Maintainability, and Availability Continue the systematical management and elimination of failures and failure modes through identification, classification, analysis and removal or mitigation. Continue the refinement of the MCM, SUW and ASW RAM models by integrating actual data collected during mission package TECHEVAL, Initial Operational Test and Evaluation (IOT&E) and Fleet operations and conduct multiple sensitivity analysis to quantify the effect of					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
alternate sparing philosophies (i.e., more onboard spares, complete spare system, etc.) based on mission module availability. Conduct root cause analysis and recommend corrective action on all discovered failure modes. Continue utilizing FRACAS to feedback MCM, SUW and ASW product and process improvements to the Systems Engineering and ILS organizations. Draft RAM-C Analysis Reports for new and updated analysis. Update RAM-C Rationale Report as required to reflect the new and updated analysis. Perform RAM modeling at the module level to support requirements development for OPNAV CPDs, as required. Support VV&A efforts and ad hoc analysis, as directed. Integrating SUW SSMM on Freedom variant to support DT event; Integrating MCM MP UMS on INDY variant in support of DT event; MPAS-CMS Integration Testing at DIF & MSIC; Conducting Seaframe feasibility studies with both shipbuilders for ASW, MCM and SUW MP Integration; .MSSIT Test Kit Development for Aviation and Mission Package Interfaces; Common Software Architecture Integration; MPCE v1.9 INCOs on new ships; and Maintain ICD 2.0 and IDS Next Configuration Management. Training Management Coordinate efforts of four training Integrated Project Teams (IPTs): MCM, SUW, ASW, and Common systems. Develop programmatic documentation updates for Cost Analysis Requirements Document (CARD), Manpower Estimate Report (MER), and Three NTSPs: MCM, ASW and SUW. Continue to integrate LCS MM program training with LCS platform program training, and support Surface and Expeditionary Warfare Training Council (SEWTC). ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	188.872	160.058	116.871	0.000	116.871

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 1600: *LCS Common Mission Modules Equipment*	23.061	27.840	34.666	-	34.666	29.388	30.221	24.282	24.666	Continuing	Continuing
• 1601: *LCS MCM Mission Modules*	67.451	57.146	55.870	-	55.870	73.903	75.373	158.293	188.844	Continuing	Continuing
• 1602: *LCS ASW Mission Modules.*	0.000	31.952	0.000	-	0.000	82.188	54.553	90.354	61.808	Continuing	Continuing
• 1603: *LCS SUW Mission Modules*	35.228	22.466	52.960	-	52.960	56.556	30.093	12.454	42.929	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 1605: *Remote Minehunting System (RMS)*	53.077	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• 4221: *LCS Module Weapons*	0.000	2.776	13.110	-	13.110	13.628	13.424	13.701	13.977	Continuing	Continuing

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
Conducted the SUW MP TECHEVAL/IOT&E aboard LCS 1 variant
Conducted SUW MP DT, TECHEVAL and IOT&E on LCS 2 variant
MCM Minehunting Platform Decision
Conduct ASW IOT&E on LCS 1 and 2 variants
Conduct MCM MP TECHEVAL/IOT&E

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
6.1 System Engineering	C/CPFF	AAC : Uniontown, PA	0.637	0.000		0.000		0.000		-		0.000	0.000	0.637	-
6.1 System Engineering	C/CPFF	CACI : Fairfax, VA	1.147	1.921	Jan 2016	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
6.1 System Engineering	C/CPFF	ESS-TBD : Washington, DC	0.000	0.000		1.031	Dec 2016	0.129	Nov 2017	-		0.129	0.000	1.160	-
6.1 System Engineering	C/CPFF	Lockheed Martin : Riviera Beach, FL	1.233	1.233	Dec 2015	0.000		0.000		-		0.000	0.000	2.466	-
6.1 System Engineering	WR	NAVSEALOGCEN : Norfolk, VA	0.000	0.731	Nov 2015	0.620	Dec 2016	0.369	Dec 2017	-		0.369	0.000	1.720	-
6.1 System Engineering	C/CPFF	Northrop Grumman : Bethpage, NY	6.558	2.652	Dec 2015	4.225	Dec 2016	1.020	Feb 2018	-		1.020	Continuing	Continuing	Continuing
6.1 System Engineering	WR	NSWC Carderock : Bethesda, MD	1.130	0.400	Nov 2015	1.000	Nov 2016	0.000		-		0.000	0.000	2.530	-
6.1 System Engineering	WR	NSWC PHD : Port Hueneme, CA	0.765	0.343	Feb 2016	0.350	Jan 2017	0.000		-		0.000	0.000	1.458	-
6.1 System Engineering	WR	SPAWAR PAC : San Diego, CA	4.431	1.500	Jan 2016	1.500	Dec 2016	0.750	Dec 2017	-		0.750	Continuing	Continuing	Continuing
6.1 System Engineering	C/CPIF	Booz Allen Hamilton : Washington, DC	0.000	0.000		0.000		0.810	Jan 2018	-		0.810	0.000	0.810	-
6.4 Integration, Assembly, Test and Checkout	C/CPFF	CACI : Fairfax, VA	0.950	0.950	Jan 2016	0.000		0.000		-		0.000	0.000	1.900	-
6.4 Integration, Assembly, Test and Checkout	Sub Allot	CECOM Bldg 1207 : Various	0.367	0.475	Jan 2016	0.250	Feb 2017	0.000		-		0.000	0.000	1.092	-
6.4 Integration, Assembly, Test and Checkout	WR	NAWC AD : Patuxent River, MD	0.000	0.300	Oct 2015	0.950	Mar 2017	0.000		-		0.000	0.000	1.250	-
6.4 Integration, Assembly, Test and Checkout	C/CPFF	Northrop Grumman : Bethpage, NY	0.673	0.575	Dec 2015	0.250	Jan 2017	0.325	Dec 2017	-		0.325	0.000	1.823	-
6.4 Integration, Assembly, Test and Checkout	WR	NSWC Carderock : Bethesda, MD	6.677	0.300	Nov 2015	1.000	Dec 2016	1.492	Jan 2018	-		1.492	0.000	9.469	-
6.4 Integration, Assembly, Test and Checkout	WR	NSWC Crane : Crane, Indiana	1.613	0.280	Nov 2015	0.000		0.000		-		0.000	0.000	1.893	-
6.4 Integration, Assembly, Test and Checkout	WR	NSWC PHD : Port Hueneme, CA	0.658	0.320	Dec 2015	0.225	Jan 2017	0.350	Nov 2017	-		0.350	0.000	1.553	-

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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
6.4 Integration, Assembly, Test and Checkout	WR	SPAWAR PAC : San Diego, CA	0.000	0.580	Dec 2015	0.750	Jan 2017	0.750	Feb 2018	-		0.750	Continuing	Continuing	Continuing
6.4 Integration, Assembly, Test and Checkout	WR	SUPSHIP Bath : Bath, ME	0.000	1.495	Mar 2016	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
6.4 Integration, Assembly, Test and Checkout	WR	SUPSHIP Gulfcoast : Pascagoula, MS	0.000	2.500	Jan 2016	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
6.4 Integration, Assembly, Test and Checkout	WR	NAVAIR : Lakehurst	0.000	0.000		0.200	Mar 2017	0.325	Dec 2017	-		0.325	0.000	0.525	-
6.4 Integration, Assembly, Test and Checkout	C/CPIF	Booz Allen Hamilton : Washington, DC	0.000	0.000		0.525	Jan 2017	0.500	Jan 2018	-		0.500	0.000	1.025	-
4.0 Common Equipment Development	C/CPFF	AAC : Uniontown, PA	3.053	5.201	Jan 2016	4.707	Feb 2017	2.650	Mar 2018	-		2.650	0.000	15.611	-
4.0 Common Equipment Development	WR	NAWC TSD : Orlando, FL	0.000	0.750	Mar 2016	0.000		0.354	Jan 2018	-		0.354	0.000	1.104	-
4.0 Common Equipment Development	C/CPFF	Northrop Grumman : Bethpage, NY	1.128	0.350	Jan 2016	0.544	Dec 2016	0.575	Feb 2018	-		0.575	Continuing	Continuing	Continuing
4.0 Common Equipment Development	WR	NSWC DD : Dahlgren, VA	0.904	0.600	Oct 2015	0.438	Nov 2016	0.000		-		0.000	Continuing	Continuing	Continuing
4.0 Common Equipment Development	WR	NSWC PC : Panama City, FL	4.322	0.000	Oct 2015	4.425	Nov 2016	4.813	Dec 2017	-		4.813	Continuing	Continuing	Continuing
4.0 Common Equipment Development	WR	NUWC NPT : Newport, RI	0.622	0.550	Oct 2015	0.402	Dec 2016	0.500	Nov 2017	-		0.500	Continuing	Continuing	Continuing
4.0 Common Equipment Development	WR	PMW 760 : Various	0.478	0.238	Feb 2016	0.173	Jan 2017	0.000		-		0.000	0.000	0.889	-
4.0 Common Equipment Development	C/CPFF	Progeny : Manassas, VA	0.000	1.000	Jan 2016	0.730	Mar 2017	0.000		-		0.000	0.000	1.730	-
4.0 Common Equipment Development	TBD	SBIR : Various	0.000	0.000	Mar 2016	0.000		0.000		-		0.000	0.000	0.000	-
4.0 Common Equipment Development	WR	SPAWAR PACIFIC : San Diego, CA	1.155	0.950	Dec 2015	0.694	Dec 2016	0.710	Jan 2018	-		0.710	0.000	3.509	-
4.0 Common Equipment Development	C/CPIF	Booz Allen Hamilton : Washington, DC	0.000	0.000		1.121	Dec 2016	0.480	Dec 2017	-		0.480	0.000	1.601	-

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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
1.0 MCM MP	C/CPFF	Northrop Grumman : Bethpage, NY	0.000	0.745	Nov 2015	0.544	Dec 2016	0.000		-		0.000	0.000	1.289	-
1.0 MCM MP	WR	NSWC Corona : Corona	0.000	0.571	Nov 2015	0.544	Jan 2017	0.000		-		0.000	0.000	1.115	-
1.0 MCM MP	WR	NSWC PC : Panama City, FL	19.704	13.810	Oct 2015	29.846	Nov 2016	17.492	Dec 2017	-		17.492	Continuing	Continuing	Continuing
1.0 MCM MP	WR	NSWC PHD : Port Hueneme, CA	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
1.0 MCM MP	MIPR	PM266 : Pax Rive, MD	0.000	0.400	Mar 2016	0.407	Mar 2017	0.000		-		0.000	0.000	0.807	-
1.0 MCM MP	Sub Allot	PMS 406 : Various	11.861	16.000	Jan 2016	11.000	Mar 2017	3.900	Nov 2017	-		3.900	0.000	42.761	-
1.0 MCM MP	Sub Allot	PMS 495 : Various	0.000	0.000		0.000		0.460	Feb 2018	-		0.460	0.000	0.460	-
1.0 MCM MP	MIPR	PMW 760 : San Diego, CA	0.000	0.000		0.173	Jan 2017	0.000		-		0.000	0.000	0.173	-
1.0 MCM MP	C/CPIF	Booz Allen Hamilton : Washington, DC	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
1.0 MCM MP	C/CPFF	PMS 501 : Washington, DC	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
2.0 ASW MP	C/CPFF	CACI : Arlingrton, VA	0.343	0.258	Jan 2016	0.000		0.000		-		0.000	0.000	0.601	-
2.0 ASW MP	WR	CDSA Dam Neck : Virginia Beach, VA	1.389	3.723	Oct 2015	4.775	Dec 2016	1.248	Nov 2017	-		1.248	0.000	11.135	-
2.0 ASW MP	Sub Allot	RTI Contractor : Various	2.568	28.800	Jan 2016	2.500	Mar 2017	16.188	Jan 2018	-		16.188	0.000	50.056	-
2.0 ASW MP	C/CPFF	Lockheed Martin : Various	0.000	0.000		3.307	Feb 2017	0.000		-		0.000	0.000	3.307	-
2.0 ASW MP	WR	NAWC WD : Point Mugu, CA	0.000	2.030	Jan 2016	3.000	Feb 2017	0.400	Mar 2018	-		0.400	0.000	5.430	-
2.0 ASW MP	C/CPFF	Northrop Grumman : Bethpage, NY	1.647	3.500	Jan 2016	3.417	Dec 2016	2.376	Feb 2018	-		2.376	0.000	10.940	-
2.0 ASW MP	WR	NSWC DD : Dahlgren, VA	0.196	0.250	Nov 2015	0.000		0.425	Dec 2017	-		0.425	0.000	0.871	-

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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
2.0 ASW MP	WR	NSWC PHD : Port Hueneme, CA	0.000	0.000		0.000		1.550	Nov 2017	-		1.550	0.000	1.550	-
2.0 ASW MP	WR	NUWC KPT : Keyport, WA	0.441	0.154	Nov 2015	0.000		0.950	Feb 2018	-		0.950	0.000	1.545	-
2.0 ASW MP	WR	NUWC NPT : Newport, RI	8.767	7.574	Oct 2015	7.422	Dec 2016	13.958	Nov 2017	-		13.958	0.000	37.721	-
2.0 ASW MP	Sub Allot	PEO IWS5 : Various	25.320	8.300	Jan 2016	4.870	Mar 2017	11.304	Dec 2017	-		11.304	0.000	49.794	-
2.0 ASW MP	C/CPFF	SPA : Washington, DC	0.587	0.600	Dec 2015	0.250	Jan 2017	0.250	Apr 2018	-		0.250	0.000	1.687	-
2.0 ASW MP	WR	SSC PAC : San Diego, CA	3.133	1.100	Dec 2015	0.000		0.718	Dec 2017	-		0.718	0.000	4.951	-
2.0 ASW MP	C/FPIF	Booz Allen Hamilton : Washington, DC	0.000	0.000		0.000		0.500	Dec 2017	-		0.500	0.000	0.500	-
3.0 SUW MP	C/CPFF	JAMS PO : Various	0.000	0.000		6.480	Feb 2017	1.500	Mar 2018	-		1.500	0.000	7.980	-
3.0 SUW MP	WR	NAWC WD : Ridgecrest, CA	5.826	2.000	Jan 2016	0.000		0.000		-		0.000	0.000	7.826	-
3.0 SUW MP	C/CPFF	Northrop Grumman : Bethpage, NY	26.681	15.883	Dec 2015	15.960	Dec 2016	2.000	Feb 2018	-		2.000	0.000	60.524	-
3.0 SUW MP	WR	NSWC CD : Crane, IN	0.196	0.200	Dec 2015	0.000		0.000		-		0.000	0.000	0.396	-
3.0 SUW MP	WR	NSWC Corona : Corona, CA	0.245	0.250	Nov 2015	0.250	Jan 2017	0.950	Jan 2018	-		0.950	0.000	1.695	-
3.0 SUW MP	WR	NSWC DD : Dahlgren, VA	20.711	17.308	Oct 2015	14.900	Nov 2016	7.397	Jan 2018	-		7.397	Continuing	Continuing	Continuing
3.0 SUW MP	WR	NSWC PHD : Port Hueneme, CA	9.137	13.500	Dec 2015	2.000	Jan 2017	5.800	Nov 2017	-		5.800	Continuing	Continuing	Continuing
3.0 SUW MP	Sub Allot	PEO IWS 3 : Various	0.000	7.319	Dec 2015	2.500	Feb 2017	0.000		-		0.000	0.000	9.819	-
		Subtotal	177.253	170.469		140.255		106.268		-		106.268	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603596N / *(U)LCS Mission Modules*	Project (Number/Name) 3129 / *LCS Mission Package Development*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
6.5 Training Systems Development	C/CPFF	CACI : Fairfax, VA	1.104	1.250	Jan 2016	0.000		0.000		-		0.000	0.000	2.354	-
6.5 Training Systems Development	WR	CNSF : San Diego, CA	1.104	0.900	Dec 2015	0.555	Jan 2017	0.000		-		0.000	Continuing	Continuing	Continuing
6.5 Training Systems Development	WR	JHU/APL : Laurel, MD	0.979	0.500	Feb 2016	0.000	Feb 2017	0.000		-		0.000	0.000	1.479	-
6.5 Training Systems Development	Sub Allot	Various : Various	0.000	1.520	Oct 2015	1.701	Mar 2017	0.443	Feb 2018	-		0.443	0.000	3.664	-
6.5 Training Systems Development	C/CPIF	Booz Allen Hamilton : Washington, DC	0.000	0.000		0.000		1.144	Dec 2017	-		1.144	0.000	1.144	-
		Subtotal	3.187	4.170		2.256		1.587		-		1.587	-	-	-

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
6.3 System Test and Evaluation	WR	NSWC PHD : Port Hueneme, CA	12.928	5.500	Dec 2015	7.820	Jan 2017	1.300	Nov 2017	-		1.300	0.000	27.548	-
6.3 System Test and Evaluation	WR	SPAWAR PAC : San Diego, CA	1.958	1.300	Jan 2016	2.000	Dec 2016	1.021	Dec 2017	-		1.021	0.000	6.279	-
6.3 System Test and Evaluation	WR	COMOPTEVFOR : Norfolk, VA	1.694	1.300	Jan 2016	1.300	Mar 2017	1.294	Jan 2018	-		1.294	0.000	5.588	-
		Subtotal	16.580	8.100		11.120		3.615		-		3.615	0.000	39.415	-

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
6.2 Program Management	C/CPFF	CACI : Fairfax, VA	5.015	2.683	Jan 2016	0.000		0.000		-		0.000	0.000	7.698	-
6.2 Program Management	FFRDC	Mitre : McLean, VA	0.000	1.379	Nov 2015	1.300	Jan 2017	0.000		-		0.000	0.000	2.679	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603596N / *(U)LCS Mission Modules*	Project (Number/Name) 3129 / *LCS Mission Package Development*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
6.2 Program Management	C/CPFF	Northrop Grumman : Bethpage, NY	0.000	2.071	Nov 2015	1.440	Dec 2016	1.466	Feb 2018	-		1.466	0.000	4.977	-
6.2 Program Management	C/CPFF	NSWC Crane : Various	0.000	0.000		1.750	Dec 2016	1.177	Nov 2017	-		1.177	0.000	2.927	-
6.2 Program Management	C/CPIF	BAH : Washington DC	0.000	0.000		1.937	Nov 2016	2.758	Dec 2017	-		2.758	0.000	4.695	-
		Subtotal	5.015	6.133		6.427		5.401		-		5.401	0.000	22.976	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	202.035	188.872		160.058		116.871		-		116.871	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603596N / *(U)LCS Mission Modules*	**Project (Number/Name)** 3129 / *LCS Mission Package Development*

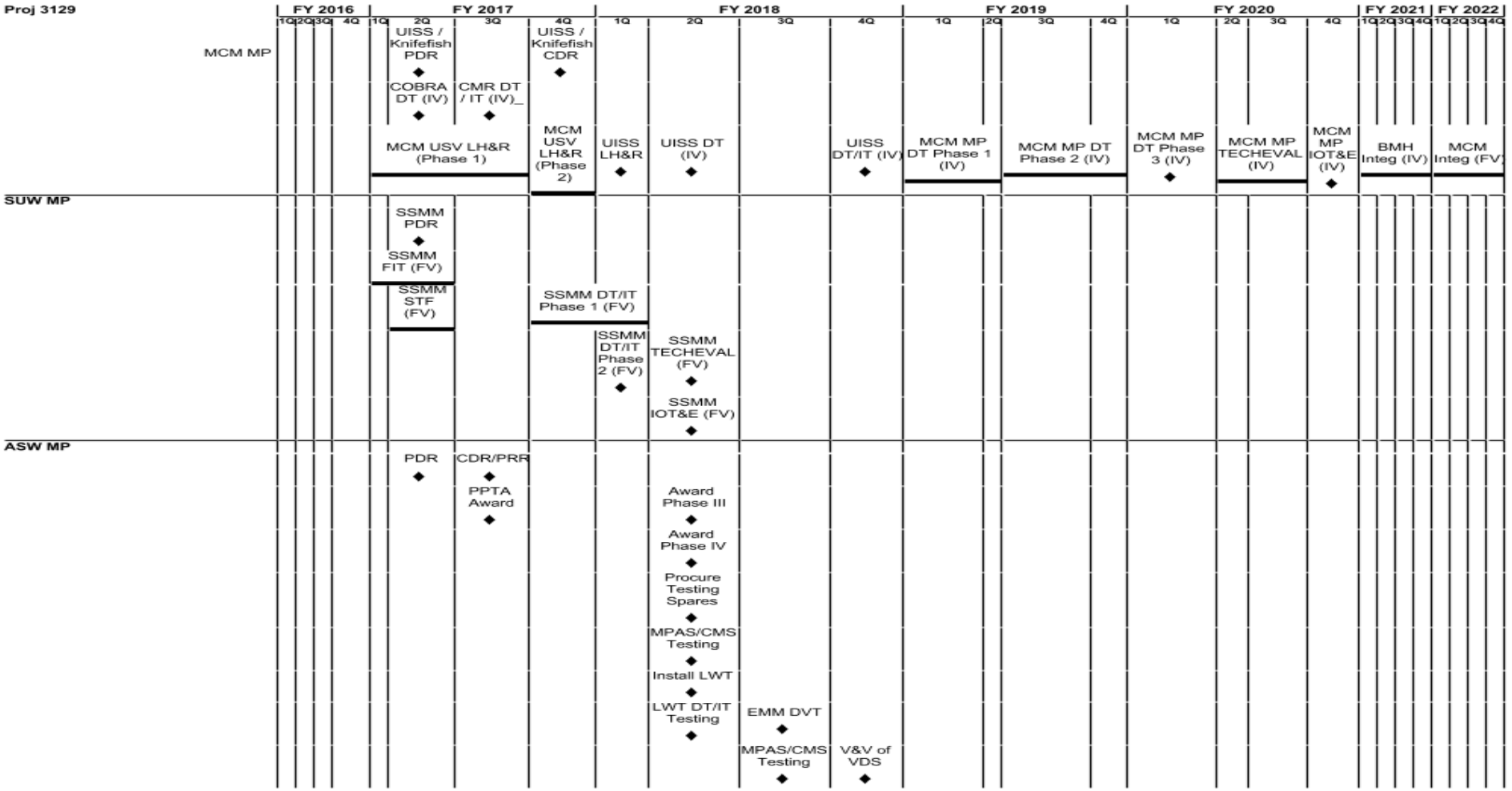

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603596N / *(U)LCS Mission Modules*	**Project (Number/Name)** 3129 / *LCS Mission Package Development*

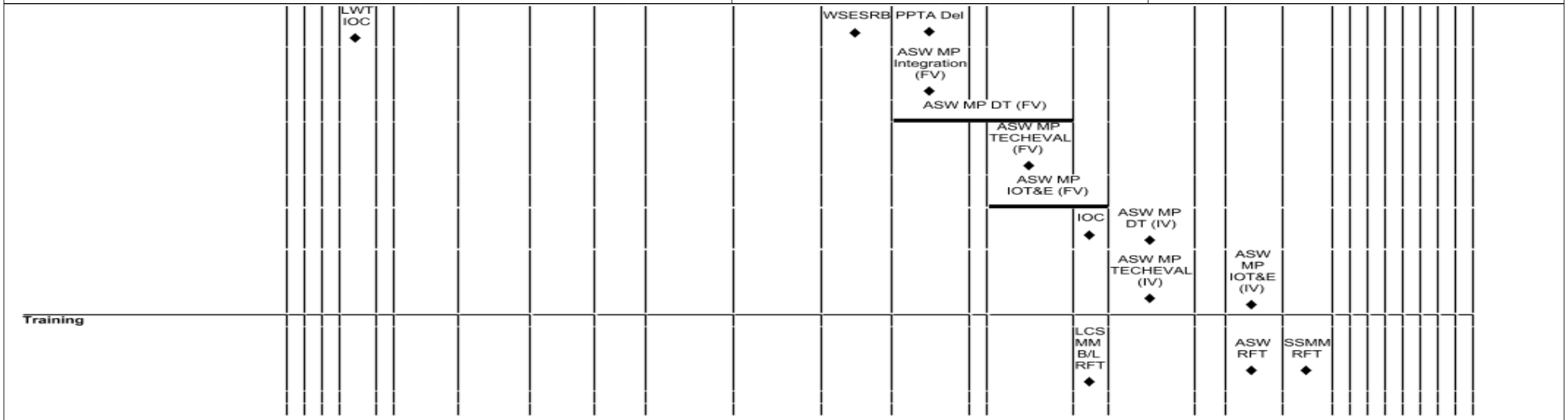

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603596N / *(U)LCS Mission Modules*	**Project (Number/Name)** 3129 / *LCS Mission Package Development*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3129				
MCM MP: MCM MP UISS / Knifefish PDR	2	2017	2	2017
MCM MP: MCM MP UISS / Knifefish CDR	4	2017	4	2017
MCM MP: COBRA Mission System DT (Indy Variant)	2	2017	2	2017
MCM MP: MCM MP COBRA DT / IT (Indy Variant)	3	2017	3	2017
MCM MP: Launch, Handling, & Recovery Testing Phas 1 (MCM USV) (Indy Variant)	1	2017	3	2017
MCM MP: Launch, Handling, & Recovery Testing Phase 2 (MCM USV) (Indy Variant)	4	2017	4	2017
MCM MP: MCM MP UISS DT (Indy Variant)	2	2018	2	2018
MCM MP: MCM MP UISS DT/IT (Indy Variant)	4	2018	4	2018
MCM MP: MCM MP DT Phase I (Indy Variant)	1	2019	2	2019
MCM MP: MCM MP DT Phase 2 (Indy Variant)	3	2019	4	2019
MCM MP: MCM MP DT Phase 3 (Indy Variant)	1	2020	1	2020
MCM MP: MCM MP TECHEVAL (Indy Variant)	2	2020	3	2020
MCM MP: MCM MP IOT&E (Indy Variant)	4	2020	4	2020
MCM MP: Launch, Handling, & Recovery Testing Phas 1 (UISS) (Free Variant)	1	2018	1	2018
MCM MP: BMH (Knifefish) Integration (Indy Variant)	1	2021	4	2021
MCM MP: Start MCM Integration on Freedom	1	2022	4	2022
SUW MP: SUW MM SSMM PDR	2	2017	2	2017
SUW MP: Surface-to-Surface Missle Module Functional Integration Test (FIT) (Free Var)	1	2017	2	2017
SUW MP: SSMM Structural Test Fire (STF) (Free Var)	2	2017	2	2017
SUW MP: SSMM DT / IT Phase 1 (Free Var)	4	2017	1	2018
SUW MP: SSMM DT / IT Phase 2 (Free Var)	1	2018	1	2018

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603596N / *(U)LCS Mission Modules*	**Project (Number/Name)** 3129 / *LCS Mission Package Development*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
SUW MP: SSMM TECEVAL (Free Var)	2	2018	2	2018
SUW MP: SSMM IOT&E (Free Var)	2	2018	2	2018
ASW MP: ASW MP PDR	2	2017	2	2017
ASW MP: ASW MP CDR/PRR	3	2017	3	2017
ASW MP: ASW MP Pre-Production Test Article (PPTA) Award	3	2017	3	2017
ASW MP: Award phase III (Integration and Testing) CLIN on the Raytheon contract	2	2018	2	2018
ASW MP: Award phase IV (Integrated Logistic Package) CLIN on Raytheon contract	2	2018	2	2018
ASW MP: Procure Testing Spares to support DT/TECHEVAL/IOT&E in FY19	2	2018	2	2018
ASW MP: ASW MPAS with CMS Integration and Testing (Land Based)	2	2018	2	2018
ASW MP: Install Light Weight Tow (LWT) SHIPALT	2	2018	2	2018
ASW MP: Conduct LWT Developmental Testing (DT/IT)	2	2018	2	2018
ASW MP: Conduct EMM DVT (Design Verification Test)	3	2018	3	2018
ASW MP: ASW MPAS with CMS integration and testing shipboard	3	2018	3	2018
ASW MP: Conduct V&V of the VDS and Handling equipment	4	2018	4	2018
ASW MP: Conduct WSESRB	4	2018	4	2018
ASW MP: ASW MP PPTA 1 Delivery	1	2019	1	2019
ASW MP: Establish LWT IOC	4	2016	4	2016
ASW MP: ASW MP Integration (Freedom Variant)	1	2019	1	2019
ASW MP: ASW MP DT-B3 (Freedom Variant)	1	2019	3	2019
ASW MP: ASW MP TECHEVAL DT-C3 (Freedom Variant)	3	2019	3	2019
ASW MP: ASW MP IOT&E OT-C3 (Freedom Variant)	3	2019	4	2019
ASW MP: ASW MP IOC	4	2019	4	2019
ASW MP: ASW MP DT-B6 (Independence Variant)	1	2020	1	2020
ASW MP: ASW MP TECHEVAL DT-C6 (Independence Variant)	1	2020	1	2020
ASW MP: ASW MP IOT&E OT-C6 (Independence Variant)	3	2020	3	2020
Training: ASW LTF Initial Ready For Training	3	2020	3	2020

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603596N / *(U)LCS Mission Modules*	**Project (Number/Name)** 3129 / *LCS Mission Package Development*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Training: SUW Courseware Update (SSMM) RFT	4	2020	4	2020
Training: Initial LCS MM Baseline Final Ready for Training RFT	4	2019	4	2019

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603597N *I (U)Automated Test and Analysis*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	17.455	22.188	0.000	8.052	-	8.052	8.037	8.025	8.174	8.332	Continuing	Continuing
9B88: *Automated Test and Analysis*	17.455	22.188	0.000	8.052	-	8.052	8.037	8.025	8.174	8.332	Continuing	Continuing

A. Mission Description and Budget Item Justification

Prior to FY 2016, the Navy developed a capability called Automated Test and Retest (ATRT). ATRT supported reproducible and quantitative testing and analysis of Naval Ship Combat Systems Integration, AEGIS Combat System Advanced Capability Build (ACB) 12, Antisubmarine Warfare Integrated Common Processor/Acoustic Rapid Commercial Off The Shelf Insertion (ARCI), and Littoral Combat Ship (LCS) Mission Module development. Funding also supported expansion of ATRT to other NAVSEA-affiliated programs. The success of ATRT in reducing the time to complete critical testing, improve and speed test analysis, find and correct critical design flaws has led to an expansion of the capability to a Naval enterprise wide effort, not just a Navy Ship effort. In FY 2016, ATRT was expanded to include the entire Naval enterprise and renamed Automated Test and Analysis (ATA). ATA expands the automated test methods currently in use such as Automated Test and Re-Test, adds new methods of testing and use of automated test technologies, and standardizes automated test practices, methods and tools. 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	23.000	0.000	8.000	-	8.000
Current President's Budget	22.188	0.000	8.052	-	8.052
Total Adjustments	-0.812	0.000	0.052	-	0.052
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.812	0.000			
• Rate/Misc Adjustments	0.000	0.000	0.052	-	0.052

Change Summary Explanation

FY16: Funding reduced by $812K to support the Small Business Innovative Research (SBIR) program.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603597N / *(U)Automated Test and Analysis*	Project (Number/Name) 9B88 / *Automated Test and Analysis*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
9B88: *Automated Test and Analysis*	17.455	22.188	0.000	8.052	-	8.052	8.037	8.025	8.174	8.332	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Prior to FY 2016, the Navy developed a capability called Automated Test and Retest (ATRT). ATRT supported reproducible and quantitative testing and analysis of Naval Ship Combat Systems Integration, AEGIS Combat System Advanced Capability Build (ACB) 12, Antisubmarine Warfare Integrated Common Processor/Acoustic Rapid Commercial Off The Shelf Insertion (ARCI), and Littoral Combat Ship (LCS) Mission Module development. Funding also supported expansion of ATRT to other NAVSEA-affiliated programs. The success of ATRT in reducing the time to complete critical testing, improve and speed test analysis, find and correct critical design flaws has led to an expansion of the capability to a Naval enterprise wide effort, not just a Navy Ship effort. In FY 2016, ATRT was expanded to include the entire Naval enterprise and renamed Automated Test and Analysis (ATA). ATA expands the automated test methods currently in use such as Automated Test and Re-Test, adds new methods of testing and use of automated test technologies, and standardizes automated test practices, methods and tools. 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Automated Test and Analysis	22.188	0.000	8.052	0.000	8.052
Articles:	-	-	-	-	-
FY 2016 Accomplishments: As of December 2015 twenty six proposals were selected based on their ability to best describe technical merit for ten criteria to include extensibility, 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. Initially Executed Projects: With the initial budget of $8M, ATA was able to provide support to ten projects - Link-16 Non-C2 - Undersea Tracking Ranges - Strike Force Interoperability - Service Oriented Architecture (SOA)					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603597N / *(U)Automated Test and Analysis*	**Project (Number/Name)** 9B88 / *Automated Test and Analysis*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Tactical Ground Radio IP Network - Digital Battlespace Environment Simulator (DBES) - Global Combat Support Systems - Marine Corps (GCCS-MC) - Common Control System (CCS) - Joint Mission Planning System (JMPS) - Electronic Chart Display and Information System - Navy (ECDIS-N) Additional Projects: With the $15M received in a December Congressional Plus up, ATA was able to provide support to an additional sixteen projects - Joint Ultra-High Frequency MILSATCOM Network Integrated Control System (JMINI CS) - Test Manager Enhancements - Rapid Control and Automation Tool (RCAT) - Dark Ether Enhancement - Automated SONAR Operation and Analysis Reporting - CVN-68 SCS Cybersecurity - Enterprise Solution Enhancements - Tomahawk Mission Planning Center (TMPC) - SPY-6 Software Development (AMDR System T&E) - Ship Self Defense System (SSDS) - Ballistic Missile Submarine (SSBN) Modernization - LCS SUW MP - Continuous Integration - LCS Mission Modules CSA - Scientific Test and Analysis Techniques for ATA - (SQQ-89) Automated Combat SoS Integration The ATA Program continued 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, improve and speed test analysis, and identify and correct critical design flaws in Navy acquisition programs for					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603597N / *(U)Automated Test and Analysis*	**Project (Number/Name)** 9B88 / *Automated Test and Analysis*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
further study in FY 2017. These automated testing projects will reduce errors, increase capabilities and enhance reporting timelines for critical Navy program initiatives. ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** Continue to improve on the automated testing and analysis investments to date. Reevaluate selected ATA FY 2017 proposals for potential suitability in FY 2018. FY 2018 plans will also build upon the results and lessons learned from the FY 2016 and FY 2017 selection process for improved ATA program planning, selection, execution and analysis with the ATA ESG. 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 savings 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. The Navy will continue: - Assessing undersea warfare capabilities or fleet modernization and future Navy testing competencies - Evaluating best practices and research platform network resiliency and system function validation - Determining common elements through ATA analysis - Identify synergies in development, implementation and training across multiple SYSCOMs - Augmenting both surface and air Mission Planning for requirements traceability. Specific topics include but are not limited to: - Continuing advanced Combat System development/enhancements (SSDS and AEGIS) - Testing of shipboard navigation or mechanical systems and tactical data links analysis (Link-16) - Integrating test and analyses among various Strike Force Interoperability platforms - Implementing test planning/manager improvements					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603597N / *(U)Automated Test and Analysis*	**Project (Number/Name)** 9B88 / *Automated Test and Analysis*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 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 2019. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	22.188	0.000	8.052	0.000	8.052

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, improve and speed test analysis, and find and correct critical design flaws 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 will be advertised and made available across the Naval enterprise for acquisition program consideration, funding, and use.

E. Performance Metrics

FY 2016 Program Management was directed to assess ATA projects for:
- Technical improvements/quality of the end-product,
- Use of automation to optimize resource efficiencies for test planning, execution, analysis and reporting
- Cost savings to the program
- 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
- Quarterly Program Reviews
- Bi-Annual ATA Executive Steering Group Meetings

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603599N *I (U)Frigate Development*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	0.000	18.965	84.900	143.450	-	143.450	141.599	73.415	76.460	71.098	Continuing	Continuing
3086: *Frigate*	0.000	18.965	84.900	143.450	-	143.450	141.599	73.415	76.460	71.098	Continuing	Continuing
Program MDAP/MAIS Code: **Project MDAP/MAIS Code(s):** 374												

Note

PE 0603599N was created per Congressional direction to establish a new budget line item.

A. Mission Description and Budget Item Justification

As directed by the Secretary of Defense (SECDEF) in 2014, the Navy via the Small Surface Combatant Task Force (SSCTF) reviewed the capabilities of Littoral Combat Ship (LCS) and explored alternatives to provide a more lethal and survivable ship to meet future missions. The SSCTF recommendations served as the foundation for the revised requirements for the modified LCS (designated as the Frigate (FF)) and an award no later than FY2019. Previous budgets and schedules supported the plan to develop the FF.

As a result of the Navy's 2016 Force Structure Assessment and to address increasingly complex threats in the global maritime environment, the Navy is reassessing the capabilities required to ensure the Frigate paces future threats. The Navy desires to maximize the capability of the future Guided Missile Frigate (FFG(X)) in anti-surface warfare(SUW), anti-submarine warfare (ASW) and local air defense (LAD) mission areas, while keeping the ship affordable and part of a "high-low" mix of surface combatants. Our updated assessment will be completed to support finalization of FFG(X) requirements by Spring 2017.

The FFG(X) program is currently updating their cost estimates based on schedule updates to include the no later than FY20 start, additional capabilities, and programmatic decisions. FY17 will focus on efforts for the performance specification (P-SPEC) development, based on updated FFG(X) requirements, and on the conceptual design contract development. Funding in FY18 will maintain Government Furnished Equipment (GFE) development, Combat Management System (CMS) design, coding, and test, C4I testing facility (C4I system innovation facility) configuration and system engineering efforts timelines from previous FF schedule to ensure mature Government Furnished Information (GFI) deliveries to the shipbuilding competition. Additional new efforts in FY18/19 reflect the conceptual design tasking, which will support the tentative FY19 Detail Design and Construction (DD&C) Request for Proposal (RFP) release. FY20 funding decreases are due the movement of costs for systems engineering, cost estimating, and ship design management to SCN (2127). Additional decreases in FY20 include the conclusion of the conceptual design efforts.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy					Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*		R-1 Program Element (Number/Name) PE 0603599N *I (U)Frigate Development*			
B. Program Change Summary ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**
Previous President's Budget	30.000	84.900	62.800	-	62.800
Current President's Budget	18.965	84.900	143.450	-	143.450
Total Adjustments	-11.035	0.000	80.650	-	80.650
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.035	0.000			
• Program Adjustments	0.000	0.000	80.143	-	80.143
• Rate/Misc Adjustments	0.000	0.000	0.507	-	0.507
• Congressional Add Adjustments	-10.000	-	-	-	-

Change Summary Explanation

FY16 Adjustments:
$10M was transferred and executed out of LCS PE (0603581N PU 3096) due to new PE not established until after the FY 2016 Continuing Resolution.
$1.035M - SBIR taxes

FY18 Adjustments:
$80.143M - Added additional funding for revised LCS/FF Profile for new Small Surface Combatant in FY20

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603599N / *(U)Frigate Development*	Project (Number/Name) 3086 / *Frigate*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3086: *Frigate*	0.000	18.965	84.900	143.450	-	143.450	141.599	73.415	76.460	71.098	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 374

A. Mission Description and Budget Item Justification

Frigate (FF) efforts comprised of design and development efforts for a more lethal and survivable multi-mission warship focused on both anti-surface warfare and anti-submarine warfare capabilities (SUW/ASW). The FFG(X) builds on these capabilities and adds local air defense and survivability features. It includes design, development, issue resolution, certification and testing efforts required to support the design baseline for FFG(X).

The FFG(X) design and development phases include platform design and development, experimentation, combat system element integration, 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. Primary design modifications will include the FF features of an over-the-horizon surface-to-surface missile system, upgraded air defense weapons and sensors, advanced electronic warfare system and improved decoys, and the ability to employ all elements of the SUW and ASW mission packages simultaneously (horizon surface-to-surface missile system, 30mm guns, variable depth sonar, towed array and torpedo defense). FFG(X) will further add local air defense and survivability features.

The RDT&E portion of FFG(X) funding is also composed of formal Developmental and Operational Assessment 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) designs to achieve the mission capabilities and performance requirements as defined in the Frigate program's baseline 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).

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Test & Evaluation	0.450	3.902	2.500	0.000	2.500
Articles:	-	-	-	-	-
Description: Execute formal FF and 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.					
FY 2016 Accomplishments:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603599N / *(U)Frigate Development*	**Project (Number/Name)** 3086 / *Frigate*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Conducted development of FF Test and Evaluation Master Plan (TEMP) updates from existing LCS TEMP. Conducted analysis of future FF testing approaches throughout the development cycle. ***FY 2017 Plans:*** Continue development of FF Test and Evaluation Master Plan (TEMP) updates from existing LCS TEMP. Develop plan to support future updates required to support land-based SIM/STIM, modeling and test requirements for integration and test of the FF platform. Conduct testing analysis of FF structures and hull forms to verify operational effectiveness. Continue analysis of future FF testing approaches throughout the development cycle. ***FY 2018 Base Plans:*** Leverage FF Test and Evaluation Master Plan (TEMP) updates to build the FFG(X) TEMP. Support future updates required to support land-based SIM/STIM, modeling and test requirements for the integration and test of the FFG(X) platform. Leverage analysis for future FFG(X) testing approaches throughout the development cycle. Begin execution of land-based SIM/STIM efforts. ***FY 2018 OCO Plans:*** N/A					
Title: Ship Systems / C4I / Warfare Systems Engineering	18.515	80.998	140.950	0.000	140.950
Articles:	-	-	-	-	-
Description: The Frigate (FF) was a multi-mission ship that will leverage the existing Littoral Combat Ship (LCS) designs, and focuses on anti-surface warfare and anti-submarine warfare capabilities (SUW/ASW). The modifications from LCS included over-the-horizon (OTH) surface-to-surface missile system, upgraded Air Defense weapons and sensors, advanced electronic warfare system and improved decoys, and all elements of the SUW and ASW mission packages (horizon surface-to-surface missile system, 30mm guns, variable depth sonar, towed array and torpedo defense). FFG(X) will further add local air defense and survivability features. ***FY 2016 Accomplishments:*** Conducted system engineering efforts to support system requirements review (SRR) and prepared for future preliminary design review (PDR), including decomposing CDD requirements into system and warfare system element specifications, defining logical and physical interfaces, finalizing warfare system element selections, and conducting analyses to refine acquisition and contracting approaches for the FF systems. This included analysis, engineering design work and testing for OTH missile system selection. Conducted ship preliminary design, naval architecture, machinery engineering, trade-off studies, and topside design analysis for both FF ship variants to integrate warfare system, vulnerability, and recoverability improvements. Funded FF shipbuilders and prime					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603599N / *(U)Frigate Development*	**Project (Number/Name)** 3086 / *Frigate*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
integrators to assess weight reduction initiatives and design feasibility of improved systems on FF Class ships no later than FY19.					
FY 2017 Plans: Increase from FY16 to FY17 is to support development efforts detailed below to support procurement of the FF starting in FY19. The Navy began analysis of the FFG(X), which will support a FY20 contract award. Early FY17 efforts supported the FF, with later efforts focused on FFG(X). Ship Systems Engineering Early FY17 efforts supported the FF system engineering efforts related to naval architecture, machinery engineering and topside design analysis. Efforts will be focused on enhancing data developed during the Preliminary Design (PD) period within the structures, mass properties, stability, materials, hydrodynamics and arrangements/habitability disciplines to develop a biddable Technical Data Package (TDP) in support of the planned FY17 Request for Proposal (RFP). Emphasis will be placed on the structural and stability disciplines, consisting of modeling, and incorporation of lethality and survivability enhancements to the LCS Flight 0+ design, to include the flow-down impacts to the supporting machinery and electrical systems. After program restructuring in FY17, later efforts focused on the development of the performance specification (P-SPEC) from the previous FF build specification. C4I / Warfare Systems Engineering Continue system engineering efforts related to C4I and warfare systems specifications. Transition preliminary design efforts to a biddable Technical Data Package (TDP) to inform planned FY17 shipbuilding contract Request for Proposals (RFP). Continue OTH systems engineering efforts for integration of OTH missile. Continue CMS development efforts to ensure full ship integration aligns with total ship design efforts. Execute SFR/SRR for Combat System (CS). Finalize all SWaP data for C4I suites. Integrate other CS elements into total ship design. Implement additional cyber security/ information assurance (IA) measures on the warfare system and C4I suite to pace the current threat. Finalize network architecture design to support warfighter effectiveness and cyber posture. All FF efforts in C4I/warfare system engineering directly support the FFG(X). Additional capabilities are added to FFG(X) baseline.					
FY 2018 Base Plans: Increase from FY17 to FY18 is to support development efforts detailed below to support procurement of the FFG(X) starting in FY20. Additional warfighting capabilities are inherent in the FFG(X) design. Ship Systems Engineering					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603599N / *(U)Frigate Development*	**Project (Number/Name)** 3086 / *Frigate*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Government-led indicative design begins, including system engineering efforts related to naval architecture, machinery engineering and topside design analysis. Emphasis will be placed on the structural and stability disciplines, consisting of modeling, and incorporation of lethality and survivability enhancements to include the flow-down impacts to the supporting machinery and electrical systems. Continue development of the P-SPEC. Begin contractor-led conceptual designs to support FY20 competition. C4I / Warfare Systems Engineering 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 Preliminary Design Review (PDR). 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 threat. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	18.965	84.900	143.450	0.000	143.450

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• SCN/2127: *Littoral Combat Ship (LCS)*	1,414.265	1,211.625	663.011	-	663.011	758.194	1,235.410	1,155.019	2,061.188	8,770.151	27,655.663
• RDTE/0603581N/3096: *Littoral Combat Ship*	86.858	28.906	20.841	-	20.841	16.140	9.997	5.537	0.000	0.000	1,361.405

Remarks

RDTE/0603581N/3096 contains $10M of Frigate funding in FY 2016

In FY 2016 - 2019, the SCN represents LCS procurement. Beginning in FY 2020, the SCN represents FF procurement.

D. Acquisition Strategy

The FFG(X) acquisition strategy is currently being developed to pursue a competitive contract award no later than FY2020.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603599N / *(U)Frigate Development*	**Project (Number/Name)** 3086 / *Frigate*

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). 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: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603599N / *(U)Frigate Development*	Project (Number/Name) 3086 / *Frigate*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Conceptual Design Contracts	TBD	Various : Various	0.000	0.000		1.000	Sep 2017	50.000	Feb 2018	-		50.000	Continuing	Continuing	Continuing
P-SPEC Development	WR	Government Activites : Various	0.000	0.000		6.580	Mar 2017	0.500	Jan 2018	-		0.500	Continuing	Continuing	Continuing
P-SPEC Development	C/CPAF	Various Contractors : Various	0.000	0.000		2.500	Mar 2017	1.500	Jan 2018	-		1.500	Continuing	Continuing	Continuing
Ship Design Modifications	C/CPAF	Lockheed Martin : Various	0.000	2.755	Feb 2016	6.960	Dec 2016	0.000		-		0.000	0.000	9.715	-
Ship Design Modifications	C/CPAF	Austal : Mobile, AL	0.000	2.726	Jun 2016	7.260	Dec 2016	0.000		-		0.000	0.000	9.986	-
Over the Horizon (OTH) Missile Integration	WR	NAWC, China Lake : China Lake, CA	0.000	0.067	Jun 2016	0.585	Feb 2017	0.597	Feb 2018	-		0.597	Continuing	Continuing	Continuing
Over the Horizon (OTH) Missile Integration	WR	Various : Various	0.000	0.202	Feb 2016	1.075	Feb 2017	1.097	Feb 2018	-		1.097	Continuing	Continuing	Continuing
C4I Development	WR	PEO C4I : San Diego, CA	0.000	0.250	Apr 2016	1.364	Nov 2016	0.965	Nov 2017	-		0.965	Continuing	Continuing	Continuing
C4I Development	WR	SPAWAR : Charleston, SC	0.000	0.919	Apr 2016	0.786	Nov 2016	2.000	Nov 2017	-		2.000	Continuing	Continuing	Continuing
C4I Development	WR	SPAWAR : San Diego, CA	0.000	0.828	Feb 2016	1.947	Nov 2016	1.967	Nov 2017	-		1.967	Continuing	Continuing	Continuing
Common Combat Management System Development (CMS)	C/CPIF	Lockheed Martin : Various	0.000	1.052	Jun 2016	14.000	Jan 2017	22.000	Jan 2018	-		22.000	Continuing	Continuing	Continuing
Common Combat Management System Development (CMS)	C/CPAF	Austal : Mobile, AL	0.000	0.250	May 2016	0.250	Jan 2017	0.000		-		0.000	0.000	0.500	-
Common Combat Management System Development (CMS)	WR	Government Activites : Various	0.000	0.117	May 2016	2.216	Nov 2016	4.407	Nov 2017	-		4.407	Continuing	Continuing	Continuing
Warfare Systems Development	WR	NUWC, Newport : Newport, RI	0.000	0.150	Feb 2016	1.350	Nov 2016	3.300	Nov 2017	-		3.300	Continuing	Continuing	Continuing
Warfare Systems Development	WR	NSWC, DD : Dahlgren, VA	0.000	1.040	Apr 2016	4.166	Nov 2016	4.845	Nov 2017	-		4.845	Continuing	Continuing	Continuing
Warfare Systems Development	WR	NSWC, CD : Carderock, MD	0.000	0.115	Apr 2016	0.830	Nov 2016	3.475	Nov 2017	-		3.475	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603599N / *(U)Frigate Development*	Project (Number/Name) 3086 / *Frigate*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Warfare Systems Development	C/CPAF	Lockheed Martin : Various	0.000	0.100	May 2016	1.452	Dec 2016	2.162	Dec 2017	-		2.162	Continuing	Continuing	Continuing
Warfare Systems Development	Various	Various : Various	0.000	0.600	Apr 2016	2.220	Nov 2016	3.247	Nov 2017	-		3.247	Continuing	Continuing	Continuing
Aviation Integration Development	WR	NAWC, AD : Patuxent River, MD	0.000	0.263	Apr 2016	1.013	Nov 2016	1.500	Nov 2017	-		1.500	Continuing	Continuing	Continuing
Aviation Integration Development	WR	NSWC, DD : Dahlgren, VA	0.000	0.000		0.116	Dec 2016	0.118	Dec 2017	-		0.118	Continuing	Continuing	Continuing
		Subtotal	0.000	11.434		57.670		103.680		-		103.680	-	-	-

Remarks

Changes from DON18 to OSD18/PB18 effort are due to the redirection of the programs from FF to FFG(X) efforts by the Navy. Ship Design Modifications efforts were stopped and new conceptual design efforts started.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Engineering Support	WR	NSWC, CD : Carderock, MD	0.000	0.261	Feb 2016	6.554	Nov 2016	7.005	Nov 2017	-		7.005	Continuing	Continuing	Continuing
Government Engineering Support	WR	NSWC, PD : Philadelphia, PA	0.000	0.185	Feb 2016	1.575	Nov 2016	2.607	Nov 2017	-		2.607	Continuing	Continuing	Continuing
Government Engineering Support	WR	NSWC, DD : Dahlgren, VA	0.000	0.385	Feb 2016	1.445	Nov 2016	2.406	Nov 2017	-		2.406	Continuing	Continuing	Continuing
Government Engineering Support	WR	NSWC, Indian Head : Indian Head, MD	0.000	0.055	Feb 2016	0.000		0.000		-		0.000	0.000	0.055	-
Government Engineering Support	WR	NSWC, PHD : Port Hueneme, CA	0.000	0.003	May 2016	0.576	Nov 2016	0.587	Nov 2017	-		0.587	Continuing	Continuing	Continuing
Government Engineering Support	WR	Government Activites : Various	0.000	0.040	Feb 2016	0.098	Nov 2016	0.100	Nov 2017	-		0.100	Continuing	Continuing	Continuing
Contractor Engineering Support	C/CPAF	Booz Allen Hamilton : McLean, VA	0.000	0.545	Aug 2016	0.811	Feb 2017	0.725	Feb 2018	-		0.725	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603599N / *(U)Frigate Development*	Project (Number/Name) 3086 / *Frigate*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Engineering Support	C/CPAF	CACI : Arlington, VA	0.000	0.037	May 2016	0.939	Feb 2017	0.447	Nov 2017	-		0.447	Continuing	Continuing	Continuing
Contractor Engineering Support	C/CPAF	Alion : Arlington, VA	0.000	0.486	Aug 2016	4.801	Feb 2017	5.744	Feb 2018	-		5.744	Continuing	Continuing	Continuing
Contractor Engineering Support	C/CPAF	Various : Various	0.000	0.875	Aug 2016	1.974	Jan 2017	3.820	Jan 2018	-		3.820	Continuing	Continuing	Continuing
		Subtotal	0.000	2.872		18.773		23.441		-		23.441	-	-	-

Remarks

Changes from DON18 to OSD18/PB18 effort are due to the redirection of the programs from FF to FFG(X) efforts by the Navy. Increase funding for FY 17/18 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 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Model/ Hull Form Testing	WR	NSWC, CD : Carderock, MD	0.000	0.320	Mar 2016	3.482	Nov 2016	0.000		-		0.000	0.000	3.802	-
Test and Evaluation Master Plan (TEMP) Development	C/CPAF	Alion : Arlington, VA	0.000	0.130	May 2016	0.420	Dec 2016	0.500	Dec 2017	-		0.500	Continuing	Continuing	Continuing
Land Based Integration & Test	WR	Government Activites : Various	0.000	0.000		0.000		1.000	Dec 2017	-		1.000	Continuing	Continuing	Continuing
Land Based Integration & Test	TBD	Lockheed Martin : Various	0.000	0.000		0.000		1.000	Nov 2017	-		1.000	Continuing	Continuing	Continuing
		Subtotal	0.000	0.450		3.902		2.500		-		2.500	-	-	-

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	C/CPAF	Alion : Arlington, VA	0.000	0.786	Feb 2016	1.290	Dec 2016	1.099	Dec 2017	-		1.099	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
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Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	WR	Various : Various	0.000	3.423	Mar 2016	3.265	Dec 2016	12.730	Dec 2017	-		12.730	Continuing	Continuing	Continuing
		Subtotal	0.000	4.209		4.555		13.829		-		13.829	-	-	-

Remarks

Program Management Support includes Program Office support, PEO LCS taxes, travel, and funds for equipment/supplies.

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	18.965		84.900		143.450		-		143.450	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603599N / *(U)Frigate Development*	**Project (Number/Name)** 3086 / *Frigate*

FFG(X) Program Schedule

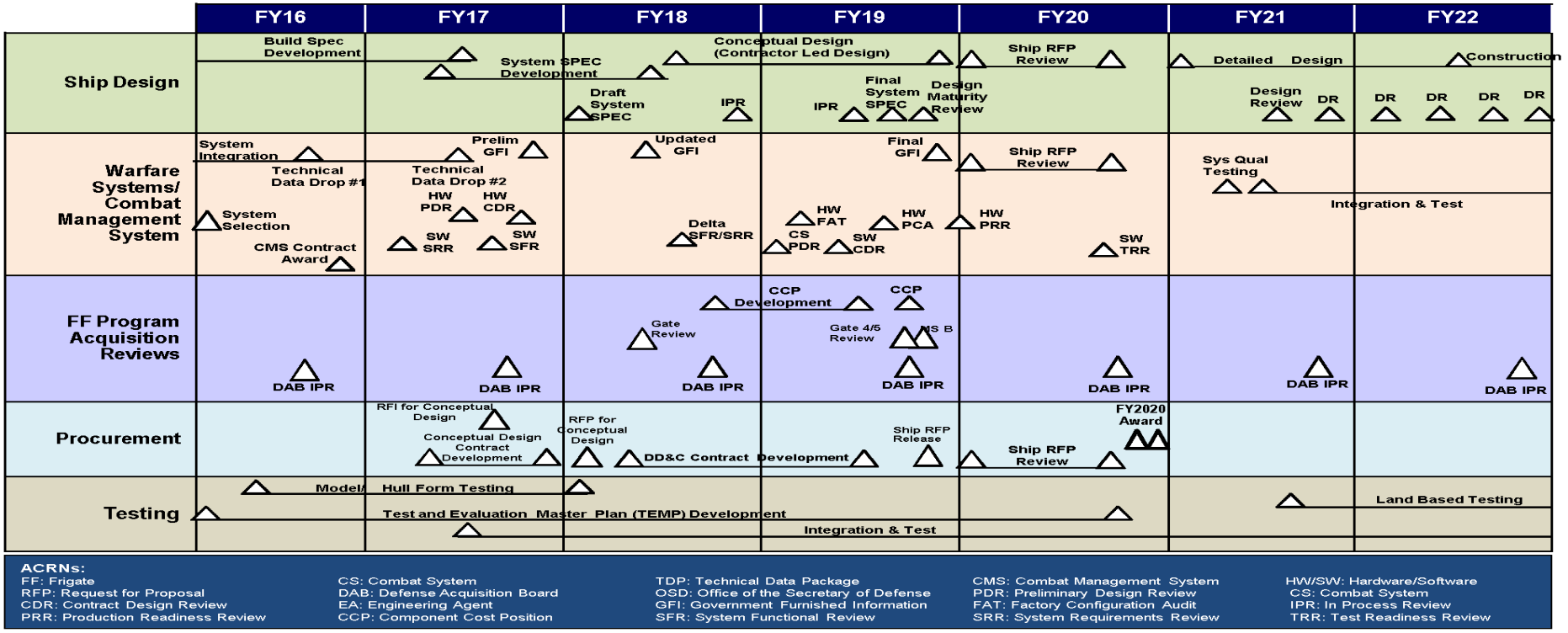


Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603599N / *(U)Frigate Development*	**Project (Number/Name)** 3086 / *Frigate*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3086				
Build Spec /P-SPEC Development	1	2016	2	2018
Warfare System Selection	1	2016	1	2016
Warfare Systems Integration	1	2016	3	2017
Test and Evaluation Master Plan (TEMP) Development	1	2016	3	2020
Model / Hull Form Testing	2	2016	4	2017
Technical Data Package Data Drop #1	3	2016	3	2016
Combat Management System (CMS) Contract Award	4	2016	4	2016
Component Cost Position (CCP) Development	4	2018	3	2019
In Process Review #1	4	2018	4	2018
In Process Review #2	2	2019	2	2019
CS Software System Requirements Review (SRR)	2	2017	2	2017
Technical Data Package Data Drop #2	3	2017	3	2017
Integration and Test	2	2017	1	2022
CMS Hardware Preliminary Design Review (PDR)	2	2017	2	2017
Draft P-Spec Approval	1	2018	1	2018
CMS Hardware Critical Design Review (CDR)	4	2017	4	2017
CS Software System Functional Review (SFR)	3	2017	3	2017
Final P-SPEC Approval	3	2019	3	2019
Ship Design Maturity Review	3	2019	3	2019
Production RFP Released	4	2019	4	2019
RFP for Conceptual Design	1	2018	1	2018
DD&C Contract Development	2	2018	3	2019

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603599N / *(U)Frigate Development*	**Project (Number/Name)** 3086 / *Frigate*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
CS Software Preliminary Design Review (PDR)	3	2018	3	2018
RFP Review and Downselect	1	2020	3	2020
CMS Hardware Factory Acceptance Testing (FAT)	3	2018	3	2018
CS Software Critical Design Review (CDR)	2	2019	2	2019
CMS Hardware Physical Configuration Audit (PCA)	4	2019	4	2019
CMS Hardware Production Readiness Review (PRR)	1	2020	1	2020
CS Software Test Readiness Review (TRR)	3	2020	3	2020
Detailed Design	1	2021	4	2022
System Qualification Testing	2	2021	2	2021
Land Based Testing	3	2021	4	2022
CS Integration and Test	3	2021	4	2022

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603609N *I Conventional Munitions*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	222.735	7.676	8.342	8.909	-	8.909	8.561	8.751	8.943	9.122	Continuing	Continuing
0363: *Insensitive Munitions Adv. Development*	222.735	7.676	8.342	8.909	-	8.909	8.561	8.751	8.943	9.122	Continuing	Continuing

A. Mission Description and Budget Item Justification

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.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	7.678	8.342	8.938	-	8.938
Current President's Budget	7.676	8.342	8.909	-	8.909
Total Adjustments	-0.002	0.000	-0.029	-	-0.029
• 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	-0.029	-	-0.029

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603609N / *Conventional Munitions*	Project (Number/Name) 0363 / *Insensitive Munitions Adv. Development*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0363: *Insensitive Munitions Adv. Development*	222.735	7.676	8.342	8.909	-	8.909	8.561	8.751	8.943	9.122	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Insensitive Munitions Adv. Development	7.676	8.342	8.909	0.000	8.909
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 2016 Accomplishments:

Evaluate and demonstrate IM propellants and propulsion systems which provide improved or comparable performance to in-service systems and better IM characteristics. Combine candidate IM propellants and case

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603609N / *Conventional Munitions*	**Project (Number/Name)** 0363 / *Insensitive Munitions Adv. Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
concepts to demonstrate compliance with IM and performance requirements. Demonstrate an insensitive multi-mission, high performance rocket motor. Evaluate options for minimum smoke propellants for shoulder launched applications. Evaluate and demonstrate IM boost propellant formulation for future Tomahawk systems providing improved and comparable performance to in-service systems and better IM characteristics. Assess combined candidate IM propellants and case concepts to demonstrate compliance with IM and performance requirements. Design a composite booster case for Tomahawk which will improve IM performance for cook-off and impact scenarios. Look at new ways to develop rocket propellant formulations that meet performance requirements and solve IM deficiencies. Resolve IM problems using top down approach. Evaluate ordnance and container concepts. Assess the operations utility of current and projected IM improvements to determine current state of IM and prioritize future funding for IM technology. Assess shielding evaluation of Tomahawk VLS storage canister. Review modeling to solve impact and cook-off with AUR pallet in support of a cooperative effort with AGS LRLAP. The technical focus is on new weapons and PIP. Evaluate and demonstrate MK54 ASROC VLA solid propellant rocket IM capabilities that meet performance. Demonstrate and qualify improved booster explosives and insensitive metalized propellants that are IM compliant for Tomahawk weapon systems. Evaluation of all issues and concerns related to heated RDX discoloration. Perform demonstration and qualification testing of AMRAAM and Sidewinder for joint insensitive munitions to improve response to combat and hazards. Evaluate and provide a modular ballistic shield for protection of Navy munitions. Assess characterization of MEMS in support of IM Navy qualifications. Demonstrate and qualify Insensitive Primer for large caliber gun propellant charges. IMAD works collaboratively with the JIMTP to transition JIMTP's S&T products to address PEO IM requirements. The PEOs IMSPs provide a comprehensive IM technology requirements list that helps to focus IM technology thrusts throughout DoD. In FY 2016 program will continue to support the demonstration and qualification of IM improved booster explosive for GP Bombs; the demonstration and qualification of insensitive metalized propellants in IM compliant rocket motors for high performance systems such as Standard Missile and Tomahawk; and to perform process development of cook-off resistant TPE a potential replacement for all explosives. And were feasible start Evaluation and demonstration of an improved Solid propellant for IM compliant Mk-135 rocket motor, Container secondary cook-off mitigation evaluation, Evaluation and demonstration of a Reduced scale fragment impact test for gun propellants, Evaluation and demonstration of Improvement of Sympathetic Reaction Modeling for the MK 54 Lightweight torpedo, Enhanced blast explosive qualification, Next generation Area attack weapon fragment impact evaluation, and demonstration of primer technologies for Navy gun propulsion systems. ***FY 2017 Plans:***					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603609N / *Conventional Munitions*	**Project (Number/Name)** 0363 / *Insensitive Munitions Adv. Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Evaluate and demonstrate IM propellants and propulsion systems which provide improved or comparable performance to in-service systems and better IM characteristics. Combine candidate IM propellants and case concepts to demonstrate compliance with IM and performance requirements. Demonstrate an insensitive multi-mission, high performance rocket motor. Evaluate options for minimum smoke propellants for shoulder launched applications. Evaluate and demonstrate IM boost propellant formulation for future Tomahawk systems providing improved and comparable performance to in-service systems and better IM characteristics. Assess combined candidate IM propellants and case concepts to demonstrate compliance with IM and performance requirements. Design a composite booster case for Tomahawk which will improve IM performance for cook-off and impact scenarios. Look at new ways to develop rocket propellant formulations that meet performance requirements and solve IM deficiencies. Resolve IM problems using top down approach. Evaluate ordnance and container concepts. Assess the operations utility of current and projected IM improvements to determine current state of IM and prioritize future funding for IM technology. Assess shielding evaluation of Tomahawk VLS storage canister. Review modeling to solve impact and cook-off with AUR pallet in support of a cooperative effort with AGS LRLAP. The technical focus is on new weapons and PIP. Evaluate and demonstrate MK54 ASROC VLA solid propellant rocket IM capabilities that meet performance. Demonstrate and qualify improved booster explosives and insensitive metalized propellants that are IM compliant for Tomahawk weapon systems. Evaluation of all issues and concerns related to heated RDX discoloration. Perform demonstration and qualification testing of AMRAAM and Sidewinder for joint insensitive munitions to improve response to combat and hazards. Evaluate and provide a modular ballistic shield for protection of Navy munitions. Assess characterization of MEMS in support of IM Navy qualifications. Demonstrate and qualify Insensitive Primer for large caliber gun propellant charges. IMAD works collaboratively with the JIMTP to transition JIMTP's S&T products to address PEO IM requirements. The PEOs IMSPs provide a comprehensive IM technology requirements list that helps to focus IM technology thrusts throughout DoD. FY 2017 will continue to support additional efforts such as evaluation and demonstration of an improved solid propellant for IM compliant Mk-135 rocket motor, container secondary cook-off mitigation evaluation, vvaluation and demonstration of a reduced scale fragment impact test for gun propellants, evaluation and demonstration of improvement of sympathetic reaction modeling for the MK 54 Lightweight torpedo, enhanced blast explosive qualification, next generation area attack weapon fragment impact evaluation, and demonstration of primer technologies for Navy gun propulsion systems. ***FY 2018 Base Plans:*** FY 2018 plans are to:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603609N / *Conventional Munitions*	**Project (Number/Name)** 0363 / *Insensitive Munitions Adv. Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 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. Demonstrate and qualify new initiation technologies for Navy gun propulsion systems. 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. 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. 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. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	7.676	8.342	8.909	0.000	8.909

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603609N / *Conventional Munitions*	**Project (Number/Name)** 0363 / *Insensitive Munitions Adv. Development*

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-2, RDT&E Budget Item Justification: FY 2018 Navy												Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603611M *I Marine Corps Assault Vehicles*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	229.238	196.991	158.682	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	584.911
0025: *Amphibious Combat Vehicle 1.1*	229.238	196.991	158.682	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	584.911
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 FY18, 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	212.173	158.682	177.520	-	177.520
Current President's Budget	196.991	158.682	0.000	-	0.000
Total Adjustments	-15.182	0.000	-177.520	-	-177.520
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-8.062	0.000			
• SBIR/STTR Transfer	-7.119	0.000			
• Program Adjustments	0.000	0.000	-177.980	-	-177.980
• Rate/Misc Adjustments	-0.001	0.000	0.460	-	0.460

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603611M *I Marine Corps Assault Vehicles*

Change Summary Explanation

Beginning in FY18, 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: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319 / 4					R-1 Program Element (Number/Name) PE 0603611M / *Marine Corps Assault Vehicles*				Project (Number/Name) 0025 / *Amphibious Combat Vehicle 1.1*			
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
0025: *Amphibious Combat Vehicle 1.1*	229.238	196.991	158.682	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	584.911
Quantity of RDT&E Articles		32	-	-	-	-	-	-	-	-		

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. FY17 and FY18 funds will support Amphibious Combat Vehicle (ACV) Increment 1.1 Engineering, Manufacturing and Development (EMD) contracts, Test & Evaluation (T&E) activities and associated program support.

Note: 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 FY18, 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 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**
Title: Product Development	165.237	109.536	0.000	0.000	0.000
Articles:	32	-	-	-	-
Description: System design and development; EMD test vehicle manufacturing; prime contractor Developmental and Operational test, and Logistics Management Information (LMI) data development. NOTE: The increase in Product & Development between FY17 & FY18 ($29.297M) is attributed to the procurement of 4 Full-up System Level (FUSL) vehicles, Contractor support Initial Operational Test & Evaluation (IOT&E), and Live Fire Test & Evaluation (LFT&E), and FUSL-vehicle Government Furnished Equipment (GFE) procurement. ***FY 2016 Accomplishments:*** - Completed the EMD contract award. Contract was awarded to two vendors to build 16 test vehicles each (32 total). - Completed Preliminary and Critical Design reviews.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603611M / *Marine Corps Assault Vehicles*	**Project (Number/Name)** 0025 / *Amphibious Combat Vehicle 1.1*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Initiated manufacturing of 32 test vehicles. ***FY 2017 Plans:*** - Complete EMD manufacturing and receive 32 test vehicle deliveries. - Initiate break-in operations and acceptance testing. - Initiate vehicle acceptance review. - Initiate contractor developmental test activities. - Initiate corrective action modifications that result from Reliability Growth Testing. ***FY 2018 Base Plans:*** Details provided in PE 0605611M /Project 0025 ***FY 2018 OCO Plans:*** N/A					
Title: Management Services	12.267	7.033	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: Contract Advisory and Assistance Services (Engineering and Technical Support, Management Support Services, and Studies and Analyses). NOTE: The increase in Management Support Services between FY17 & FY18 ($0.209K) is attributed to the additional logistics and test and evaluation support ($1.254M) and the reduction of Engineering and Technical Services ($1.045M) due to the completion of the NATC Tire Study and decrease in Modeling & Simulation (M&S) Force Protection effort. ***FY 2016 Accomplishments:*** - Continued business, acquisition, logistics, and engineering related activities for program document development, program analysis, acquisition logistics management, and financial management support. - Initiated engineering and technical services for Remote Weapon Station (RWS) marinization, logistical, maintenance support, and integration. - Initiated analyses of product support elements to support Maintenance Plan development, Support and Test Equipment, Calibration, and other logistics elements. ***FY 2017 Plans:***					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603611M / *Marine Corps Assault Vehicles*	**Project (Number/Name)** 0025 / *Amphibious Combat Vehicle 1.1*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Continue business, acquisition, logistics, and engineering related activities for program document development, program analysis, acquisition logistics management, and financial management support. - Continue engineering and technical services for RWS, logistical, maintenance support, and integration. - Initiate facilities impact assessment at ACV 1.1 fielding locations, and continue analyses of product support elements to support Maintenance Plan development, Support and Test Equipment, Calibration, and other logistics elements. - Initiate force protection modeling and simulation activities. - Initiate Depot Source of Repair (DSOR) Analyses on secondary repairable items, and product support Business Case Analysis on concepts. ***FY 2018 Base Plans:*** Details provided in PE 0605611M /Project 0025. ***FY 2018 OCO Plans:*** N/A					
Title: Test & Evaluation ***Articles:*** ***Description:*** Government Developmental, Operational, and Live Fire Test and Evaluation activities. ***FY 2016 Accomplishments:*** - Completed Event Design Plans supporting development test. - Initiated Developmental (DT), Operational (OT), and Live Fire Test and Evaluation (LFT&E) planning events to support development of detailed test strategies. ***FY 2017 Plans:*** - Initiate formation of the Operational Test (OT) team and begin initial development of the OT detailed test plan. - Initiate training for personnel to support execution of Developmental Test, OT, and LFT&E events. - Initiate development test efforts for two vendors on 32 EMD vehicles - Initiate DT activities such as: Land Mobility, Safety/Human Factors, Lethality, Water Mobility, Communication, and Survivability - Initiate LFT&E activities. - Initiate training for conduct of Operational Assessment (OA) ***FY 2018 Base Plans:***	5.485 -	32.170 -	0.000 -	0.000 -	0.000 -

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603611M / *Marine Corps Assault Vehicles*	**Project (Number/Name)** 0025 / *Amphibious Combat Vehicle 1.1*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Details provided in PE 0605611M /Project 0025					
FY 2018 OCO Plans: N/A					
Title: Program Support	14.002	9.943	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: Government labor, material, and travel for integrated logistics support, technical publications, support equipment development, in-house technical support, and program management support.					
FY 2016 Accomplishments: - Continued Digital Integrated Facility (DIF) Architecture support. - Initiated engineering support for Government Furnished Property (GFP) integration efforts documented during technical information and review meetings; generate products, acquire equipment and software to implement Vehicle Integration for C4ISR/EW Interoperability (VICTORY) initiative compliance process. - Initiated hydrodynamic model testing; Reliability, Availability, and Maintainability (RAM-D), and human systems integration activities. - Initiated inventory, checkout, kitting, shipment, and trouble shooting ACV 1.1 GFP. - Initiated Remote Weapons Station (RWS) marinization efforts.					
FY 2017 Plans: - Continue engineering support for communication suite integration efforts documented during technical information and review meetings. - Continue hydrodynamic model testing; Reliability, Availability, and Maintainability (RAM-D), and human systems integration activities. - Continue procurement, inventory, checkout, kitting, shipment, and troubleshooting of ACV 1.1 communications suite GFP spares to support development test. - Continue DIF Architecture support. - Continue RWS marinization and integration support. - Initiate technical support for training packages.					
FY 2018 Base Plans: Details provided in PE 0605611M /Project 0025.					
FY 2018 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603611M / *Marine Corps Assault Vehicles*	**Project (Number/Name)** 0025 / *Amphibious Combat Vehicle 1.1*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A					
Accomplishments/Planned Programs Subtotals	196.991	158.682	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• PMC/2025: *Amphibious Combat Vehicle 1.1*	0.000	0.000	161.511	-	161.511	169.811	316.064	471.775	0.761	0.000	1,119.922
• PMC/2026: *Amphibious Combat Vehicle 1.2*	0.000	0.000	0.000	-	0.000	0.000	0.000	0.000	603.826	0.000	603.826
• PMC/7000/0605611M: *Initial Spares - ACV 1.1*	0.000	0.000	5.569	-	5.569	6.221	14.115	13.798	0.000	0.000	39.703
• RDT&E/0605611M/0025: *Amphibious Combat Vehicle 1.1*	0.000	0.000	178.993	-	178.993	50.382	33.530	1.705	0.588	0.000	265.198
• RDT&E/0605611M/0026: *Amphibious Combat Vehicle 1.2*	0.000	0.000	0.000	-	0.000	29.400	0.000	31.600	60.699	Continuing	Continuing
• PMC7000/0605611M: *Initial Spares - ACV 1.2*	0.000	0.000	0.000	-	0.000	0.000	0.000	0.000	19.539	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 FY16 and will down-select to one vendor at Milestone C. In FY18 the program will enter into Low Rate Initial Production (LRIP) and Full Rate Production (FRP) will begin in FY20.

E. Performance Metrics

Milestone Reviews
Milestone B: 1QFY16
Milestone C: 3QFY18

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603611M / *Marine Corps Assault Vehicles*	**Project (Number/Name)** 0025 / *Amphibious Combat Vehicle 1.1*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
System Design & Development	C/FPIF	Various : Various	152.315	164.510	Nov 2015	109.536	Jan 2017	0.000		-		0.000	45.961	472.322	-
Other Product Development	C/FFP	SPAWAR/ NEW JERSEY : Charleston/Picatinny	13.117	0.727	Jul 2016	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	183.938	165.237		109.536		0.000		-		0.000	45.961	504.672	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 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	0.398	1.075	Apr 2016	0.425	Apr 2017	0.000		-		0.000	0.775	2.673	-
Technical Data & Pubs Development	WR	NSWC Carderock : Philadelphia, PA	0.000	0.050	Sep 2016	0.100	Sep 2017	0.000		-		0.000	0.000	0.150	-
GFP Management	WR	SPAWAR Charleston : SPAWAR Charleston	11.131	12.712	Apr 2016	9.308	Apr 2017	0.000		-		0.000	2.455	35.606	-
Travel	Various	Various : Various	0.626	0.165	Sep 2016	0.110	Sep 2017	0.000		-		0.000	0.280	1.181	-
		Subtotal	14.417	14.002		9.943		0.000		-		0.000	3.510	41.872	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603611M / *Marine Corps Assault Vehicles*	**Project (Number/Name)** 0025 / *Amphibious Combat Vehicle 1.1*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Operational Test Evaluation (OT&E)	WR	MCOTEA : Quantico, Va	0.000	0.258	Jan 2016	7.510	Jan 2017	0.000		-		0.000	12.583	20.351	-
Development Test & Evaluation	WR	Various : Various	0.000	2.740	Jan 2016	18.074	Jan 2017	0.000		-		0.000	10.317	31.131	-
Live Fire Test & Evaluation	WR	Various : Various	0.000	2.487	Jan 2016	6.586	Jan 2017	0.000		-		0.000	8.509	17.582	-
		Subtotal	0.000	5.485		32.170		0.000		-		0.000	31.409	69.064	-

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 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering and Technical Services	C/FFP	Various : Various	14.536	2.973	Jul 2016	1.945	Jul 2017	0.000		-		0.000	1.256	20.710	-
Management Support Services	C/FFP	DDG : Stafford VA	10.032	9.294	Apr 2016	4.788	Mar 2017	0.000		-		0.000	0.450	24.564	-
Studies and Analyses	C/FFP	Various : Various	6.315	0.000		0.300	Jul 2017	0.000		-		0.000	0.600	7.215	-
		Subtotal	30.883	12.267		7.033		0.000		-		0.000	2.306	52.489	-

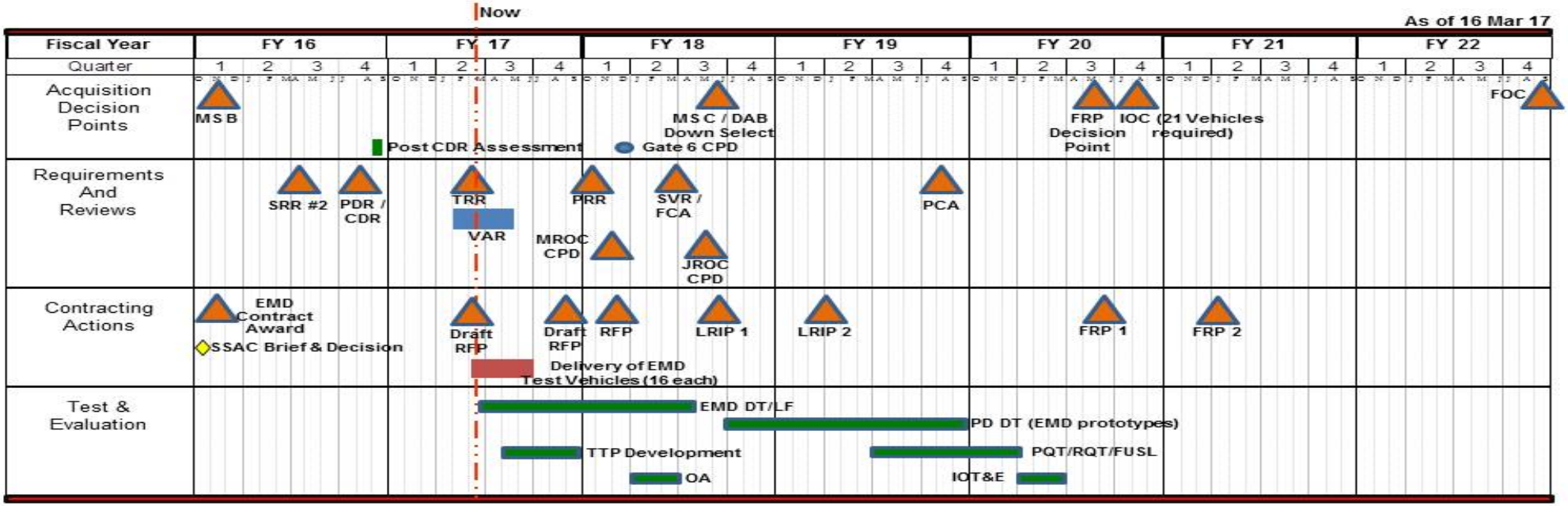
	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	229.238	196.991		158.682		0.000		-		0.000	83.186	668.097	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603611M / *Marine Corps Assault Vehicles*	**Project (Number/Name)** 0025 / *Amphibious Combat Vehicle 1.1*

Unclassified (U)

ACV 1.1 Program Schedule



Unclassified (U)

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Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603611M / *Marine Corps Assault Vehicles*	**Project (Number/Name)** 0025 / *Amphibious Combat Vehicle 1.1*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 0025				
MS B	1	2016	1	2016
EMD Contract Award	1	2016	1	2016
System Readiness Review 2	3	2016	3	2016
Preliminary Design Review/Critical Design Review	4	2016	4	2016
EMD Vehicle Delivery (32 Vehicles)	2	2017	3	2017
Vehicle Acceptance Review	2	2017	3	2017
Development Test/Live Fire Test	2	2017	1	2020
TTP Development	3	2017	4	2017
Operational Assessment (OA)	2	2018	3	2018
Production Readiness Review (PRR)	1	2018	1	2018
System Verification Review (SVR)	2	2018	2	2018
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
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
FRP Decision	3	2020	3	2020
FRP #1 Option Exercised	3	2020	3	2020
IOC	4	2020	4	2020
FRP #2 Option Exercised	2	2021	2	2021

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603611M / *Marine Corps Assault Vehicles*	**Project (Number/Name)** 0025 / *Amphibious Combat Vehicle 1.1*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
FOC	4	2022	4	2022

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603635M *I Marine Corps Grnd Cmbt/Supt Sys*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	33.706	0.359	1.303	1.428	-	1.428	1.355	1.380	1.411	1.438	Continuing	Continuing
1964: *Anti-Armor Weapon System*	3.912	0.359	0.886	1.023	-	1.023	0.982	0.999	1.023	1.043	Continuing	Continuing
2614: *SMAW Follow-On*	29.794	0.000	0.417	0.405	-	0.405	0.373	0.381	0.388	0.395	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	0.378	1.303	1.422	-	1.422
Current President's Budget	0.359	1.303	1.428	-	1.428
Total Adjustments	-0.019	0.000	0.006	-	0.006
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.005	0.000			
• SBIR/STTR Transfer	-0.014	0.000			
• Rate/Misc Adjustments	0.000	0.000	0.006	-	0.006

Change Summary Explanation

The increase in funding from FY17 to FY18 is mostly due to efforts to improve the Saber power system and the Global Positioning System (GPS) of the Saber system.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603635M / *Marine Corps Grnd Cmbt/ Supt Sys*	Project (Number/Name) 1964 / *Anti-Armor Weapon System*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
1964: *Anti-Armor Weapon System*	3.912	0.359	0.886	1.023	-	1.023	0.982	0.999	1.023	1.043	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

The increase in funding from FY17 to FY18 ($0.137M) is due to efforts to improve the Saber power system and the Global Positioning System (GPS) of the Saber system.

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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Saber Battery Replacement	0.359	0.636	0.508	0.000	0.508
Articles:	-	-	-	-	-
FY 2016 Accomplishments: -Continued research of a replacement battery for Saber to address safety concerns, while maintaining the same or increased capabilities for power and longevity. -Continued testing of replacement battery.					
FY 2017 Plans: -Continue research of a replacement battery for Saber to address safety concerns, while maintaining the same or increased capabilities for power and longevity. -Continue testing of replacement battery.					
FY 2018 Base Plans: -Complete research of a replacement battery for Saber to address safety concerns, while maintaining the same or increased capabilities for power and longevity.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603635M / *Marine Corps Grnd Cmbt/ Supt Sys*	**Project (Number/Name)** 1964 / *Anti-Armor Weapon System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
-Complete testing of replacement battery. ***FY 2018 OCO Plans:*** N/A					
Title: Management Support ***Articles:***	0.000 -	0.000 -	0.420 -	0.000 -	0.420 -
FY 2016 Accomplishments: N/A ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** -Funding will support product improvement upgrades for the Saber System, engineering, logistics, and program office support. ***FY 2018 OCO Plans:*** N/A					
Title: Global Positioning System (GPS) Improvement ***Articles:***	0.000 -	0.250 -	0.095 -	0.000 -	0.095 -
FY 2016 Accomplishments: N/A ***FY 2017 Plans:*** -Initiate research for improvements to future GPS for the Saber system. -Initiate prototype testing of the Far-Target Locator from the US Army. ***FY 2018 Base Plans:*** -Complete research for improvements to future GPS for the Saber system. -Complete prototype testing of the Far-Target Locator and assess results. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.359	0.886	1.023	0.000	1.023

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603635M / *Marine Corps Grnd Cmbt/ Supt Sys*	**Project (Number/Name)** 1964 / *Anti-Armor Weapon System*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• PMC/3017: *Anti-Armor Weapon Systems-Heavy*	0.661	17.080	21.553	5.024	26.577	22.106	6.111	6.251	6.384	Continuing	Continuing

Remarks

D. Acquisition Strategy

The Saber system is a joint program with the U.S. Army. FY16-FY18 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-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603635M / *Marine Corps Grnd Cmbt/ Supt Sys*	Project (Number/Name) 2614 / *SMAW Follow-On*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2614: *SMAW Follow-On*	29.794	0.000	0.417	0.405	-	0.405	0.373	0.381	0.388	0.395	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The solution to the Follow on to SMAW (FOTS) capability requirement has been defined as the SMAW MOD 2 system. It is a lightweight, short range, fire-and-forget assault weapon comprised of a launcher and integral sighting system that enables a Marine to neutralize a variety of ground targets. Marine Expeditionary Forces will employ the SMAW MOD 2 across the spectrum of conflict, under all environmental conditions, to destroy a variety of ground targets. As defined in the FOTS Capability Production Document (CPD), the program consists of requirements for a new Launcher and integrated laser range finder and thermal sight. The Launcher will be physically and functionally compatible with existing inventory of SMAW rocket variants [High Explosive Dual Purpose, Anti-Armor, Novel Explosive and Common Practice (CP)] and will replace the existing Mark 153 Mod 0 SMAW launcher. R&D supports the work being performed to develop new propellant technologies for an enhanced rocket motor as well as development of the SMAW Mod 2 replacement millijoule meter and replacement bore sight kit development.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Engineer and technical support.	0.000	0.417	0.405	0.000	0.405
Articles:	-	-	-	-	-
FY 2016 Accomplishments: N/A					
FY 2017 Plans: -Continue engineering support for the development and testing of the Densified Propellant. -Initiate qualification of Densified Propellant in accordance with Technology Transition Agreement (TTA). -Initiate and complete qualification of current millijoule meter. -Initiate development of replacement bore sight kit.					
FY 2018 Base Plans: -Continue engineering support for the development and testing of the Densified Propellant. -Continue qualification of Densified Propellant in accordance with Technology Transition Agreement (TTA). -Continue development of replacement bore sight kit. -Complete qualification of current millijoule meter.					
FY 2018 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	0.000	0.417	0.405	0.000	0.405

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603635M / *Marine Corps Grnd Cmbt/ Supt Sys*	**Project (Number/Name)** 2614 / *SMAW Follow-On*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• PMC/3016: *Follow on to SMAW*	0.000	24.666	25.125	0.049	25.174	0.023	0.067	0.090	0.112	Continuing	Continuing

Remarks

D. Acquisition Strategy

FY16-FY18 strategy is to complete development and qualification of upgraded components to the SMAW MOD 2 system.

The Office of Naval Research is funding densified propellant under a Technology Transition Agreement (TTA) through late FY18. The PMO will begin programmatic documentation and planning to support transition for final design and qualification of densified propellant in FY18 if TTA technology readiness level 7 is achieved per TTA.

E. Performance Metrics

Milestone reviews and technical reviews.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603654N *I JT Service Explosive Ordn Dev*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	567.807	14.957	50.411	53.367	-	53.367	44.474	41.678	39.099	46.907	Continuing	Continuing
0377: *JT Service Expl Ord Disp System*	359.533	5.966	14.039	13.572	-	13.572	9.002	8.528	7.149	12.277	Continuing	Continuing
1317: *EOD Diving System*	105.501	1.947	5.467	5.113	-	5.113	4.499	4.606	4.707	4.801	Continuing	Continuing
3177: *Joint Counter Radio-Controlled IED Elec Warfare*	0.000	0.000	13.345	15.564	-	15.564	13.501	10.644	10.949	11.165	Continuing	Continuing
4023: *VSW MCM/Force Protection UUV*	102.773	7.044	17.560	19.118	-	19.118	17.472	17.900	16.294	18.664	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: FY 2018 Navy					Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*			**R-1 Program Element (Number/Name)** PE 0603654N *I JT Service Explosive Ordn Dev*		
B. Program Change Summary ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**
Previous President's Budget	15.329	46.911	49.624	-	49.624
Current President's Budget	14.957	50.411	53.367	-	53.367
Total Adjustments	-0.372	3.500	3.743	-	3.743
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.372	0.000			
• Program Adjustments	0.000	3.500	0.000	-	0.000
• Rate/Misc Adjustments	0.000	0.000	3.743	-	3.743

Change Summary Explanation

Other Rate/Misc Adjustments: Additional funding in support of Counter Unmanned Aerial System (C-UAS) $3.743M.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603654N / *JT Service Explosive Ordn Dev*	Project (Number/Name) 0377 / *JT Service Expl Ord Disp System*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0377: *JT Service Expl Ord Disp System*	359.533	5.966	14.039	13.572	-	13.572	9.002	8.528	7.149	12.277	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS)	0.874	2.238	2.296	0.000	2.296
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Continued limited improvements to JEOD Decision Support System (DSS) based on user input, provide Analysis of Alternatives for warfighter initiated improvements and conduct procurement, testing and evaluation of potential commercial non-development items (CNDI) meeting EOD warfighter needs.					
FY 2017 Plans: Continue improvements to the JEOD Portal, Mobile Field Kit (MFK), and Common Control platform based on user input/prioritization, provide Analysis of Alternatives for warfighter initiated improvements and conduct					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603654N / *JT Service Explosive Ordn Dev*	**Project (Number/Name)** 0377 / *JT Service Expl Ord Disp System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
procurements, testing and evaluation of potential commercial non-development items (CNDI) meeting EOD warfighters needs. ***FY 2018 Base Plans:*** 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 2018 OCO Plans:*** N/A					
Title: EOD ROBOTICS	5.092	10.437	9.956	0.000	9.956
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Conducted development and test of Advanced EOD Robotics System Increments prototypes. Continue development of Advanced EOD Robotics System Increments 1 and 2. ***FY 2017 Plans:*** Conduct testing on Advanced EOD Robotics System (AEODRS) Increment One - dismounted operations, provided by Prime Systems Integrator (PSI) development contractor. Begin development of AEODRS Increment Two - tactical operations, with PSI development contractor." ***FY 2018 Base Plans:*** Deliver 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). ***FY 2018 OCO Plans:*** N/A					
Title: TCM AN/PLT-XXX SYSTEMS	0.000	1.364	1.320	0.000	1.320
Articles:	-	-	-	-	-
FY 2016 Accomplishments: N/A ***FY 2017 Plans:***					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603654N / *JT Service Explosive Ordn Dev*	**Project (Number/Name)** 0377 / *JT Service Expl Ord Disp System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Development loadset upgrades for fielded EOD TCM systems to remain current with continually changing threats and develop loadsets beyond current theater, both CONUS/OCONUS to remain current with continual changing threats. ***FY 2018 Base Plans:*** Develop and upgrade threat loadset to remain current with continually changing threats. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	5.966	14.039	13.572	0.000	13.572

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• OPN/5509(a): *EOD Equipment (VN075)*	4.000	5.955	0.000	-	0.000	9.069	9.377	5.687	5.886	0.000	57.857

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 52 Joint Service EOD Decision Support System (DSS) change requests resulting in the release of 1,170 Mobile Field Kit and Publication Suite Software copies per quarter to the Joint Services including USN. Completed TCM, AN/PLT-5 loadset upgrade for EOD use in-theater based upon new IED/UXO threats seen during operations.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603654N / *JT Service Explosive Ordn Dev*	Project (Number/Name) 0377 / *JT Service Expl Ord Disp System*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development	WR	NSWCIHEODTD : Indian Head, MD	185.043	0.201	Nov 2015	4.746	Oct 2016	2.947	Nov 2017	-		2.947	Continuing	Continuing	Continuing
Primary Hardware Development	C/FFP	Northrop Grumman : Herdon, VA	3.500	5.544	Nov 2015	3.500	Dec 2016	0.000		-		0.000	Continuing	Continuing	Continuing
Primary Hardware Development	C/FFP	TBD : TBD	0.000	0.000		3.500	Jun 2017	8.500	Nov 2017	-		8.500	0.000	12.000	-
ILS	WR	EODTD : Indiah Head, MD	48.590	0.000	Oct 2015	0.600	Oct 2016	0.400	Nov 2017	-		0.400	Continuing	Continuing	Continuing
		Subtotal	237.133	5.745		12.346		11.847		-		11.847	-	-	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	C/CPFF	HARRIS : Herndon, VA	7.933	0.075	Oct 2015	0.350	Nov 2016	0.375	Nov 2017	-		0.375	Continuing	Continuing	Continuing
		Subtotal	7.933	0.075		0.350		0.375		-		0.375	-	-	-

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	EODTD : Indian Head, MD	76.394	0.075	Oct 2015	0.858	Nov 2016	0.900	Nov 2017	-		0.900	Continuing	Continuing	Continuing
Operation Test & Evaluation	WR	EODTD : Indian Head, MD	11.483	0.000	Oct 2015	0.085	Nov 2016	0.025	Nov 2017	-		0.025	Continuing	Continuing	Continuing
		Subtotal	87.877	0.075		0.943		0.925		-		0.925	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603654N / *JT Service Explosive Ordn Dev*	**Project (Number/Name)** 0377 / *JT Service Expl Ord Disp System*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Manangement Support	WR	EODTD : Indian Head, MD	10.138	0.071	Oct 2015	0.400	Oct 2016	0.425	Nov 2017	-		0.425	Continuing	Continuing	Continuing
Miscellaneous	WR	EODTD : Indian Head, MD	16.452	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	26.590	0.071		0.400		0.425		-		0.425	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	359.533	5.966		14.039		13.572		-		13.572	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603654N / *JT Service Explosive Ordn Dev*	**Project (Number/Name)** 0377 / *JT Service Expl Ord Disp System*

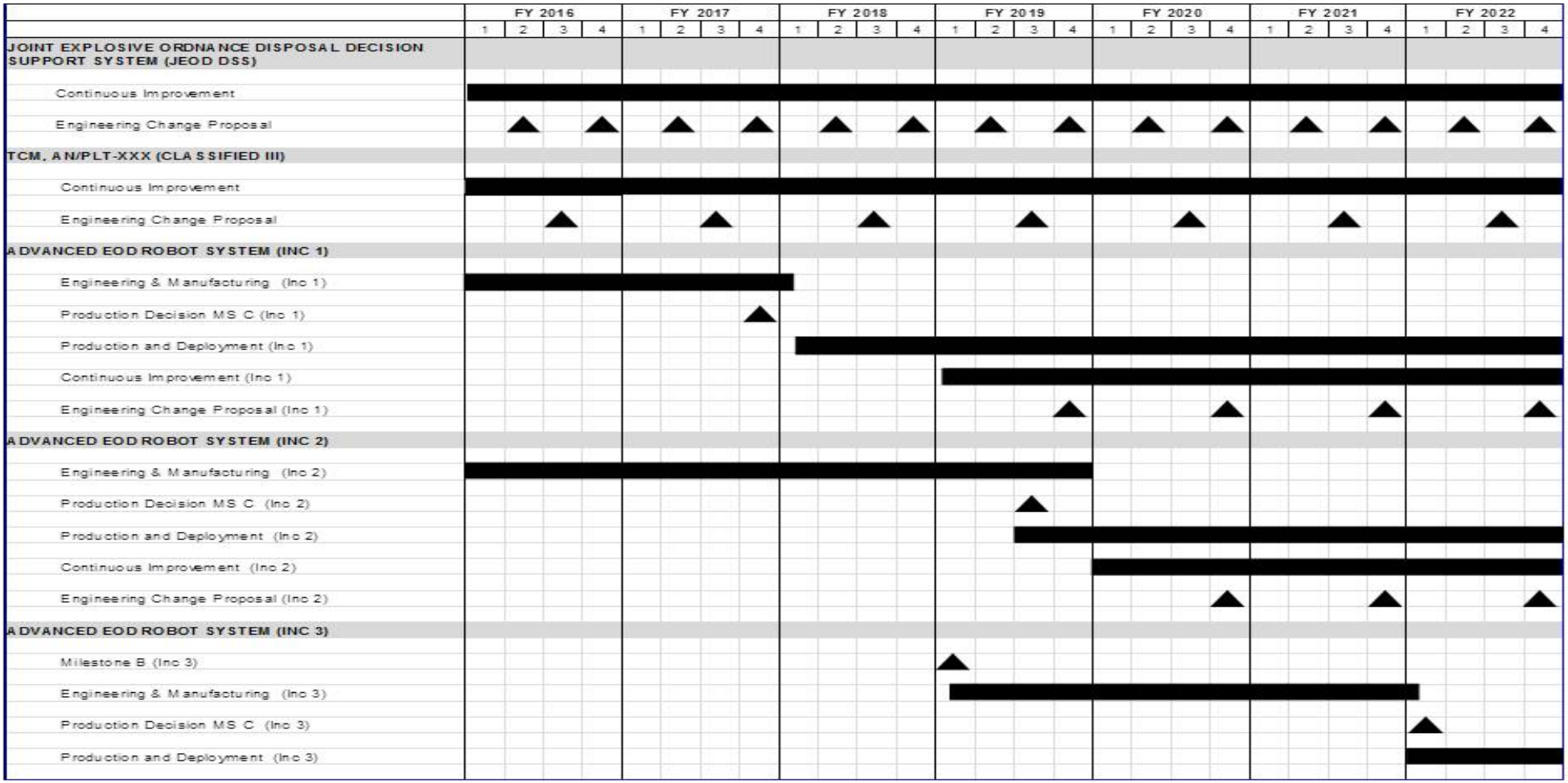

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603654N / *JT Service Explosive Ordn Dev*	**Project (Number/Name)** 0377 / *JT Service Expl Ord Disp System*

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	1	2016	4	2022
JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 1	2	2016	2	2016
JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 2	4	2016	4	2016
JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 3	2	2017	2	2017
JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 4	4	2017	4	2017
JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 5	2	2018	2	2018
JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 6	4	2018	4	2018
JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 7	2	2019	2	2019
JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 8	4	2019	4	2019
JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 9	2	2020	2	2020
JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 10	4	2020	4	2020
JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 11	2	2021	2	2021

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603654N / *JT Service Explosive Ordn Dev*	**Project (Number/Name)** 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	4	2021	4	2021
JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 13	2	2022	2	2022
JOINT EXPLOSIVE ORDNANCE DISPOSAL DECISION SUPPORT SYSTEM (JEOD DSS): Engineering Change Proposal 14	4	2022	4	2022
TCM, AN/PLT-XXX (CLASSIFIED III): Continuous Improvement	1	2016	4	2022
TCM, AN/PLT-XXX (CLASSIFIED III): Engineering Change Proposal 1	3	2016	3	2016
TCM, AN/PLT-XXX (CLASSIFIED III): Engineering Change Proposal 2	3	2017	3	2017
TCM, AN/PLT-XXX (CLASSIFIED III): Engineering Change Proposal 3	3	2018	3	2018
TCM, AN/PLT-XXX (CLASSIFIED III): Engineering Change Proposal 4	3	2019	3	2019
TCM, AN/PLT-XXX (CLASSIFIED III): Engineering Change Proposal 5	3	2020	3	2020
TCM, AN/PLT-XXX (CLASSIFIED III): Engineering Change Proposal 6	3	2021	3	2021
TCM, AN/PLT-XXX (CLASSIFIED III): Engineering Change Proposal 7	3	2022	3	2022
ADVANCED EOD ROBOT SYSTEM (INC 1): Engineering & Manufacturing (Inc 1)	1	2016	1	2018
ADVANCED EOD ROBOT SYSTEM (INC 1): Production Decision MS C (Inc 1)	4	2017	4	2017
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	2022
ADVANCED EOD ROBOT SYSTEM (INC 1): Engineering Change Proposal (Inc 1) 1	4	2019	4	2019
ADVANCED EOD ROBOT SYSTEM (INC 1): Engineering Change Proposal (Inc 1) 2	4	2020	4	2020
ADVANCED EOD ROBOT SYSTEM (INC 1): Engineering Change Proposal (Inc 1) 3	4	2021	4	2021
ADVANCED EOD ROBOT SYSTEM (INC 1): Engineering Change Proposal (Inc 1) 4	4	2022	4	2022
ADVANCED EOD ROBOT SYSTEM (INC 2): Engineering & Manufacturing (Inc 2)	1	2016	4	2019
ADVANCED EOD ROBOT SYSTEM (INC 2): Production Decision MS C (Inc 2)	3	2019	3	2019
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	2020	4	2022

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603654N / *JT Service Explosive Ordn Dev*	**Project (Number/Name)** 0377 / *JT Service Expl Ord Disp System*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
ADVANCED EOD ROBOT SYSTEM (INC 2): Engineering Change Proposal (Inc 2) 1	4	2020	4	2020
ADVANCED EOD ROBOT SYSTEM (INC 2): Engineering Change Proposal (Inc 2) 2	4	2021	4	2021
ADVANCED EOD ROBOT SYSTEM (INC 2): Engineering Change Proposal (Inc 2) 3	4	2022	4	2022
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	2022

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603654N / *JT Service Explosive Ordn Dev*	Project (Number/Name) 1317 / *EOD Diving System*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
1317: *EOD Diving System*	105.501	1.947	5.467	5.113	-	5.113	4.499	4.606	4.707	4.801	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: DIVER SAFETY & LIFE SUPPORT SYSTEMS	1.697	3.328	2.993	0.000	2.993
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 2016 Accomplishments: Completed the AoA for the Multi-mission Underwater Breathing Apparatus. Continued development, testing and evaluation of METRES product improvements.					
FY 2017 Plans: Based on the Alternative of Analysis (AoA) for the Multi-mission Underwater Breathing Apparatus (MM UBA), during FY 2017 an acquisition strategy will be developed and acquisition efforts will be performed to prepare for an acquisition designation and Milestone B in FY 2018. Continue development, testing and evaluation of METRES (i.e. diver training aide for influence ordnance) product improvements.					
FY 2018 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603654N / *JT Service Explosive Ordn Dev*	**Project (Number/Name)** 1317 / *EOD Diving System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
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. ***FY 2018 OCO Plans:*** N/A					
Title: ADVANCED DIVER INTEGRATED SENSORS	0.200	1.949	1.920	0.000	1.920
Articles:	-	-	-	-	-
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 MK 1 Mod 0 Diver Hull Inspection Navigation System (DHINS) and improvements to the MK 15 Underwater Imaging System (UIS). ***FY 2016 Accomplishments:*** Initiated acquisition program for the next generation Advanced Integrated Sensor System (STRIDENT) for Expeditionary MCM forces. Specific actions included initiation of an AoA and development of contract and acquisition strategies. Completed the enhancements to the MK 1 Mod 0 diver-based hull search capability through fleet-based product improvements. ***FY 2017 Plans:*** The STRIDENT (i.e. diver held sonar) AoA will conclude and the ACAT designation and Milestone B will be realized in FY 2017. This will enter the STRIDENT program into the engineering and manufacturing development phase in progressing towards a production decision. Continue to enhance the MK 15 Mod 0 diver-based search capability through fleet-based product improvements. ***FY 2018 Base Plans:*** The STRIDENT Engineering Development Model (EDM) contract will be awarded and the EDM will be developed and tested by the manufacturer in the remainder of FY 2018. Continue to enhance the MK 15 Mod 0 diver-based search capability through fleet-based product improvements. ***FY 2018 OCO Plans:*** N/A					
Title: ADVANCED FIRING SYSTEM	0.050	0.190	0.200	0.000	0.200
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603654N / *JT Service Explosive Ordn Dev*	**Project (Number/Name)** 1317 / *EOD Diving System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Description: Develops product improvements to existing systems for below and above water neutralization of underwater threats to support EOD and MDSU operations. ***FY 2016 Accomplishments:*** Completed testing, evaluation and imitated fielding of AFCTs, and begin development and testing of product improvement to AFD receiver subsystems. ***FY 2017 Plans:*** Complete fielding of AFCTs, and continue development and testing of product improvement to AFD receiver subsystems. ***FY 2018 Base Plans:*** Continue development and testing of product improvements to AFD receiver subsystems. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	1.947	5.467	5.113	0.000	5.113

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• OPN/0977a: *Underwater EOD Program (Cost Code UQ034)*	1.000	1.730	1.100	-	1.100	1.125	1.350	2.095	6.622	0.000	40.767
• OPN/0977b: *UW EOD (UQ036)*	0.338	0.411	0.475	-	0.475	0.660	0.660	0.660	4.050	0.000	10.454

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.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603654N / *JT Service Explosive Ordn Dev*	**Project (Number/Name)** 1317 / *EOD Diving System*

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-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603654N / *JT Service Explosive Ordn Dev*	Project (Number/Name) 3177 / *Joint Counter Radio-Controlled IED Elec Warfare*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3177: *Joint Counter Radio-Controlled IED Elec Warfare*	0.000	0.000	13.345	15.564	-	15.564	13.501	10.644	10.949	11.165	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 (JUONS). 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Joint Counter Radio-Controlled IED Elec Warfare	0.000	13.345	15.564	0.000	15.564
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: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603654N / *JT Service Explosive Ordn Dev*	**Project (Number/Name)** 3177 / *Joint Counter Radio-Controlled IED Elec Warfare*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Proposals. Also provides for the rapid development and testing of JCREW Counter-Unmanned Aerial System (C-UAS) for Joint Urgent Operational Need Statement (JUONS). ***FY 2016 Accomplishments:*** N/A ***FY 2017 Plans:*** Develop and test advanced techniques to maintain JCREW performance against evolving global RCIEDs. Execute Engineering Change Proposal to design, and fabricate hardware and software changes for Tech Insertion 1. Development and testing of threat loads and software and hardware Engineering Change Proposals (ECPs) in support of Counter-Unmanned Aerial Systems (C-UAS) Joint Urgent Operational Needs Statement (JUONS). ***FY 2018 Base Plans:*** 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 Counter-Unmanned Aerial Systems (C-UAS) Joint Urgent Operational Needs Statement (JUONS). ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.000	13.345	15.564	0.000	15.564

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• OPN/5509(b): *Explosive Ordnance Disposal Equip*	2.929	105.603	9.062	24.400	33.462	0.927	0.930	0.946	0.965	0.000	145.762

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

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603654N / *JT Service Explosive Ordn Dev*	**Project (Number/Name)** 3177 / *Joint Counter Radio-Controlled IED Elec Warfare*

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: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603654N / *JT Service Explosive Ordn Dev*	**Project (Number/Name)** 3177 / *Joint Counter Radio-Controlled IED Elec Warfare*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development	Various	TBD : TBD	0.000	0.000		1.929	Nov 2016	3.615	Jan 2018	-		3.615	Continuing	Continuing	Continuing
Systems Engineering	Various	TBD : TBD	0.000	0.000		3.464	Nov 2016	1.452	Jan 2018	-		1.452	Continuing	Continuing	Continuing
Software Development	Various	TBD : TBD	0.000	0.000		0.964	Nov 2016	1.995	Jan 2018	-		1.995	Continuing	Continuing	Continuing
System Integration	Various	TBD : TBD	0.000	0.000		0.964	Nov 2016	1.452	Jan 2018	-		1.452	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		7.321		8.514		-		8.514	-	-	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Loadset Development	FFRDC	JHU/APL, MITRE: : Laurel, MD	0.000	0.000		0.592	Nov 2016	1.004	Dec 2017	-		1.004	Continuing	Continuing	Continuing
Systems Engineering	WR	NSWC: : Various	0.000	0.000		2.036	Nov 2016	2.679	Nov 2017	-		2.679	Continuing	Continuing	Continuing
Program Management Support	WR	IHEODTD: : Indian Head, MD	0.000	0.000		0.331	Nov 2016	0.341	Nov 2017	-		0.341	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		2.959		4.024		-		4.024	-	-	-

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test & Evaluation	WR	NSWC : Various	0.000	0.000		1.208	Nov 2016	0.958	Nov 2017	-		0.958	Continuing	Continuing	Continuing
Test & Evaluation	MIPR	YPG : Yuma, Arizona	0.000	0.000		0.850	Nov 2016	1.398	Nov 2017	-		1.398	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		2.058		2.356		-		2.356	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603654N / *JT Service Explosive Ordn Dev*	**Project (Number/Name)** 3177 / *Joint Counter Radio-Controlled IED Elec Warfare*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	C/CPFF	Cydecor : Various	0.000	0.000		0.575	Dec 2016	0.290	Dec 2017	-		0.290	Continuing	Continuing	Continuing
Miscellaneous	WR	NSWC : Various	0.000	0.000		0.432	Dec 2016	0.380	Dec 2017	-		0.380	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		1.007		0.670		-		0.670	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		13.345		15.564		-		15.564	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603654N / *JT Service Explosive Ordn Dev*	**Project (Number/Name)** 3177 / *Joint Counter Radio-Controlled IED Elec Warfare*

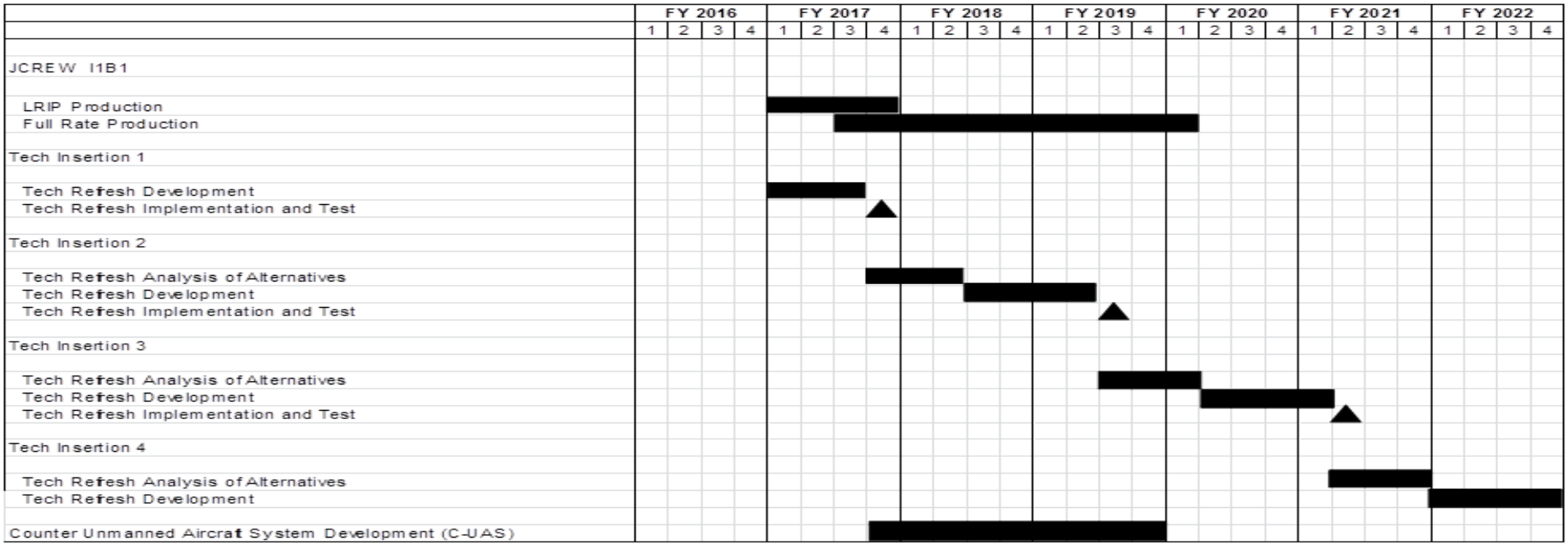

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603654N / *JT Service Explosive Ordn Dev*	**Project (Number/Name)** 3177 / *Joint Counter Radio-Controlled IED Elec Warfare*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3177				
LRIP Production	1	2017	4	2017
Full Rate Production	3	2017	3	2019
TECH INSERTION 1	1	2017	4	2017
Tech Refresh Development (1)	1	2017	3	2017
Tech Refresh Implementation and Test (1)	4	2017	4	2017
TECH INSERTION 2	4	2017	3	2019
Tech Refresh Analysis of Alternatives (2)	4	2017	2	2018
Tech Refresh Development (2)	3	2018	2	2019
Tech Refresh Implementation and Test (2)	3	2019	3	2019
TECH INSERTION 3	3	2019	2	2021
Tech Refresh Analysis of Alternatives (3)	3	2019	1	2020
Tech Refresh Development (3)	2	2020	1	2021
Tech Refresh Implementation and Test (3)	2	2021	2	2021
TECH INSERTION 4	2	2021	4	2022
Tech Refresh Analysis of Alternatives (4)	2	2021	4	2021
Tech Refresh Development (4)	1	2022	4	2022
Counter Unmanned Aerial System Development	3	2017	4	2019

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603654N / *JT Service Explosive Ordn Dev*	Project (Number/Name) 4023 / *VSW MCM/Force Protection UUV*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
4023: *VSW MCM/Force Protection UUV*	102.773	7.044	17.560	19.118	-	19.118	17.472	17.900	16.294	18.664	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 Underwater Mine Countermeasures (UMCM) 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. Note: The schedules have been re-formatted to allow for better communication of program execution.

The significant increase in RDT&E resources from FY 2016 to FY 2017 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. Additionally, the MK 19 Family of Systems will be enhanced to provide an underwater threat interdiction capability. These efforts require prototype development and significant DT&E during FY 2017. FY 2017 program execution tempo reflects over a 100% increase in activity to support capability fielding timelines from FY 2016.

FY 2017 will focus on developing, testing and ultimately fielding 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.

These efforts will significantly improve the capabilities of the projected inventory of 36 MK 18 Mod 2 vehicles and 63 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 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: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603654N / *JT Service Explosive Ordn Dev*	**Project (Number/Name)** 4023 / *VSW MCM/Force Protection UUV*

These resources also support the FY 2017 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 2017, 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: VSW MCM/Force Protection UUV	7.044	17.560	19.118	0.000	19.118
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 2016 Accomplishments:
Continued 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. Continued testing and evaluation of MK 18 UUV family of systems (FoS) capability increments and MK 19 ECP product improvements. Initiated acquisition of Expeditionary UUV Neutralization System (EUNS) program (i.e. MK 19 Family of Systems) to develop standoff explosives threat object investigation, assessment, neutralization and battle damage assessment capabilities.

FY 2017 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. Continue testing and evaluation of MK 18 UUV family of systems (FoS) capability increments; specifically these capability improvements will focus on reducing the MCM timeline as well as improving MCM performance. The MK 19 Family of Systems ECP product improvements will leverage the successes of the MK 19 HULS program and commercial systems to field a threat interdiction capability. This will be an ECP to the existing MK 19 system. The ECP process will be initiated in FY 2017 is based on the results of the previously conducted EUNS AoA.

FY 2018 Base 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

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603654N / *JT Service Explosive Ordn Dev*	**Project (Number/Name)** 4023 / *VSW MCM/Force Protection UUV*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
establishment. The MK 18 Family of Systems will achieve Milestone C for the MK 18 Mod 2 Increment 1 project; realize a production decision for the advanced sensors (i.e. ATLAS and SSAM); and enter the Engineering Development and Manufacturing phase for the MK 18 Mod 2 Increment 2 project. Also, the MK 19 Engineering Change Proposal process will field a MOTS ROV prototype for DT&E, which will start in FY 2018. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	7.044	17.560	19.118	0.000	19.118

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• OPN/0977(a): *Underwater EOD Program (Cost Code UQ034)*	33.706	11.810	30.742	3.382	34.124	27.923	22.036	22.003	14.230	0.000	251.814
• OPN/0977(b): *Expeditionary Mine Countermeasures (ExMCM) (Cost Code UQ038)*	0.000	0.000	11.396	4.016	15.412	34.371	1.165	0.599	0.611	0.000	52.158
• OPN/0977 (C): *Naval Special Warfare (NSW) (Cost Code UQ039)*	0.000	0.000	0.000	4.950	4.950	3.413	1.714	1.714	1.714	0.000	13.505

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: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603654N / *JT Service Explosive Ordn Dev*	**Project (Number/Name)** 4023 / *VSW MCM/Force Protection UUV*

E. Performance Metrics

Research and Develop technologies for the design of 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.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603654N / *JT Service Explosive Ordn Dev*	Project (Number/Name) 4023 / *VSW MCM/Force Protection UUV*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development	WR	Multiple Activites : Not Specified	18.182	1.464	Oct 2015	3.382	Oct 2016	4.240	Oct 2017	-		4.240	0.000	27.268	-
Systems Engineering	WR	NSWC, Activities : Not Specified	12.012	1.386	Oct 2015	3.159	Oct 2016	3.478	Oct 2017	-		3.478	0.000	20.035	-
Primary Hardware Development	WR	EODTECHDIV : IH, MD	16.238	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Systems Engineering	WR	EODTECHDIV : IH, MD	20.176	1.483	Oct 2015	3.458	Oct 2016	3.152	Oct 2017	-		3.152	Continuing	Continuing	Continuing
		Subtotal	66.608	4.333		9.999		10.870		-		10.870	-	-	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Technical Support	C/CPFF	HARRIS : Herndon, VA	5.383	0.293	Oct 2015	0.586	Oct 2016	0.572	Nov 2017	-		0.572	Continuing	Continuing	Continuing
		Subtotal	5.383	0.293		0.586		0.572		-		0.572	-	-	-

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	Multiple Activities : Not Specified	12.043	1.409	Oct 2015	3.519	Oct 2016	3.844	Oct 2017	-		3.844	0.000	20.815	-
Operational Test & Evaluation	WR	NSWC, Activities : Not Specified	2.492	0.465	Oct 2015	1.642	Oct 2016	1.785	Oct 2017	-		1.785	0.000	6.384	-
Developmental Test & Evaluation	WR	EODTECHDIV : IH, MD	8.619	0.375	Oct 2015	1.151	Oct 2016	1.284	Oct 2017	-		1.284	Continuing	Continuing	Continuing
Operational Test & Evaluation	WR	EODTECHDIV : IH, MD	1.424	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	24.578	2.249		6.312		6.913		-		6.913	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603654N / *JT Service Explosive Ordn Dev*	**Project (Number/Name)** 4023 / *VSW MCM/Force Protection UUV*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	WR	EODTECHDIV : IH, MD	3.883	0.169	Nov 2015	0.443	Oct 2016	0.511	Nov 2017	-		0.511	Continuing	Continuing	Continuing
Miscellaneous	WR	NSWC, Activities : Not Specified	2.303	0.000	Nov 2015	0.220	Oct 2016	0.252	Nov 2017	-		0.252	Continuing	Continuing	Continuing
DAWDF	Various	Not Specified : Not Specified	0.018	0.000		0.000		0.000		-		0.000	0.000	0.018	-
		Subtotal	6.204	0.169		0.663		0.763		-		0.763	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	102.773	7.044		17.560		19.118		-		19.118	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603654N / *JT Service Explosive Ordn Dev*	**Project (Number/Name)** 4023 / *VSW MCM/Force Protection UUV*

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603654N / *JT Service Explosive Ordn Dev*	**Project (Number/Name)** 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	2016	4	2022
---Engineering & Manufacturing (Inc 1)	1	2016	4	2017
---Testing (Inc 1)	1	2016	4	2017
---Production Decision MS C (Inc 1)	1	2018	1	2018
---Production and Deployment (Inc 1)	1	2018	3	2020
---Testing (Advance Sensors)	1	2016	2	2018
---Engineering Change Proposal (Advanced Sensors)	3	2018	3	2018
---Production and Deployment (Advanced Sensors)	3	2018	1	2021
---MS B (Inc 2)	2	2018	2	2018
---Engineering & Manufacturing (Inc 2)	3	2018	2	2021
---Testing (Inc 2)	3	2018	1	2021
---Production Decision MS C (Inc 2)	2	2021	2	2021
---Production and Deployment (Inc 2)	3	2021	4	2022
TITLE: MK 18 MOD 1 UUV	1	2016	4	2022
---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
TITLE: EOD RESPONSE (ROV) (MK 19 FAMILY OF SYSTEMS)	1	2016	4	2022
---Engineering Change Proposal Initiation	4	2017	4	2017
---Testing (Block C)-	1	2019	1	2020
---Engineering Change Proposal Decision	1	2020	1	2020

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603654N / *JT Service Explosive Ordn Dev*	**Project (Number/Name)** 4023 / *VSW MCM/Force Protection UUV*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
---Production and Deployment	2	2020	4	2022

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy												Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603658N *I Cooperative Engagement*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	527.464	72.472	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	599.936
2039: *COOP Engagement*	527.464	72.472	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	599.936
Program MDAP/MAIS Code: **Project MDAP/MAIS Code(s):** 582												

A. Mission Description and Budget Item Justification

Cooperative Engagement Capability (CEC) significantly improves Battle Force Anti-Air Warfare (AAW) capability by coordinating all Battle Force AAW sensors into a single, real-time, composite track picture to support integrated fire control.

CEC distributes sensor data from each USMC Command Control Unit, USA Aerostat, US Navy Ship, and US Navy Aircraft, or cooperating unit (CU), to all other CUs in the battle force through a real-time, line of sight, high data- rate sensor and engagement data distribution network. CEC is highly resistant to jamming and provides accurate gridlocking between CUs. Each CU independently employs high capacity, parallel processing and advanced algorithms to combine all distributed sensor data into a fire control quality track picture which is the same for all CUs. CEC data is presented as a superset of the best AAW sensor capabilities from each CU, all of which are integrated into a single input to each CU's combat weapons system.

CEC significantly improves our Battle Force defense in depth, including both local area and ship defense capabilities against current and future AAW threats. Moreover, CEC provides critical connectivity and integration of over-land air defense systems capable of countering emerging air threats, including land attack cruise missiles, in a complex littoral environment.

Each military Service funds CEC development for their combat systems. The CEC Program Office oversees CEC development for all services. CEC consists of the Data Distribution System (DDS), the Cooperative Engagement Processor (CEP), and interface with Combat Systems and sensors. The DDS encodes and distributes own-ship sensor and engagement data and is a high capacity, jam resistant, directive system providing a precision gridlocking and high throughput of data. The CEP is a high capacity distributed processor that processes force levels of data in near real-time. The data is passed to the ship's combat system as high quality data for which the ship can cue its onboard sensors or use the data to engage targets without actually tracking them.

The Navy implemented a Signal Data Processor (SDP) approach to modify the current equipment to meet reduced size, weight, cost, power and cooling objectives. This SDP approach also supports continuity for interoperability improvements and program protection, as well as supporting open architecture initiatives, and comms independence. The SDP hardware complies with Category 3 Open Architecture Computing Environment (OACE) standards. The SDP-S is being fielded fleet-wide to all US Navy, USMC, US Army, and FMS CEC units.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603658N *I Cooperative Engagement*

A family of antennas approach will be used to satisfy CEC requirements with lower life cycle costs (procurement, installation, and maintenance) and reduced weight (on mast and below deck). These antennas enable future capability as well as providing a solution extensible to additional platforms. This effort for development and production of Common Array Block (CAB) antennas was competitively awarded in late FY2013.

In support of Interoperability, CEC will continue to work collaboratively with other Combat Systems programs (AWS, E-2C, E-2D, SSDS, CDLMS, C2P, and SGS/AC) to develop the software and implement design corrections and system changes. CEC will analyze the interactions of interoperability issues and impacts and provide collaboration for development of CEC and other system changes develop the long term solutions, including the engineering process to validate small parts of developmental software ideas, and utilize M&S to validate design approaches in the systems engineering realm.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	73.786	0.000	0.000	-	0.000
Current President's Budget	72.472	0.000	0.000	-	0.000
Total Adjustments	-1.314	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.314	0.000			
• Rate/Misc Adjustments	0.000	0.000	0.000	-	0.000

Change Summary Explanation

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319 / 4					R-1 Program Element (Number/Name) PE 0603658N / *Cooperative Engagement*				Project (Number/Name) 2039 / *COOP Engagement*			
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
2039: *COOP Engagement*	527.464	72.472	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	599.936
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 582

A. Mission Description and Budget Item Justification

Cooperative Engagement Capability (CEC) significantly improves Battle Force Anti-Air Warfare (AAW) capability by coordinating all Battle Force AAW sensors into a single, real-time, composite track picture to support integrated fire control.

CEC distributes sensor data from each USMC Command Control Unit, USA Aerostat, US Navy Ship, and US Navy Aircraft, or cooperating unit (CU), to all other CUs in the battle force through a real-time, line of sight, high data- rate sensor and engagement data distribution network. CEC is highly resistant to jamming and provides accurate gridlocking between CUs. Each CU independently employs high capacity, parallel processing and advanced algorithms to combine all distributed sensor data into a fire control quality track picture which is the same for all CUs. CEC data is presented as a superset of the best AAW sensor capabilities from each CU, all of which are integrated into a single input to each CU's combat weapons system.

CEC significantly improves our Battle Force defense in depth, including both local area and ship defense capabilities against current and future AAW threats. Moreover, CEC provides critical connectivity and integration of over-land air defense systems capable of countering emerging air threats, including land attack cruise missiles, in a complex littoral environment.

Each military Service funds CEC development for their combat systems. The CEC Program Office oversees CEC development for all services. CEC consists of the Data Distribution System (DDS), the Cooperative Engagement Processor (CEP), and interface with Combat Systems and sensors. The DDS encodes and distributes own-ship sensor and engagement data and is a high capacity, jam resistant, directive system providing a precision gridlocking and high throughput of data. The CEP is a high capacity distributed processor that processes force levels of data in near real-time. The data is passed to the ship's combat system as high quality data for which the ship can cue its onboard sensors or use the data to engage targets without actually tracking them.

The Navy implemented a Signal Data Processor (SDP) approach to modify the current equipment to meet reduced size, weight, cost, power and cooling objectives. This SDP approach also supports continuity for interoperability improvements and program protection, as well as supporting open architecture initiatives, and comms independence. The SDP hardware complies with Category 3 Open Architecture Computing Environment (OACE) standards. The SDP-S is being fielded fleet-wide to all US Navy, USMC, US Army, and FMS CEC units.

A family of antennas approach will be used to satisfy CEC requirements with lower life cycle costs (procurement, installation, and maintenance) and reduced weight (on mast and below deck). These antennas enable future capability as well as providing a solution extensible to additional platforms. This effort for development and production of Common Array Block (CAB) antennas was competitively awarded in late FY2013.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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In support of Interoperability, CEC will continue to work collaboratively with other Combat Systems programs (AWS, E-2C, E-2D, SSDS, CDLMS, C2P, and SGS/AC) to develop the software and implement design corrections and system changes. CEC will analyze the interactions of interoperability issues and impacts and provide collaboration for development of CEC and other system changes develop the long term solutions, including the engineering process to validate small parts of developmental software ideas, and utilize M&S to validate design approaches in the systems engineering realm.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: E-2D	3.500	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Support DSSC 2 CEC flight test and IV&V, and develop and incorporate corrective actions as required to support E-2D CEC DSSC 2 software Product Certification Panel. Support E-2D CEC Accelerated Midterm Interoperability Improvement Project (AMIIP) and Naval Integrated Fire Control-Counter Air (NIFC-CA) Enhancements requirements development, systems engineering, and software development efforts in conjunction with E-2D DSSC 3 software development. Assess impacts of SDP-S -005 development and fielding on E-2D, and conduct related systems engineering.					
FY 2017 Plans: N/A					
FY 2018 Base Plans: N/A					
FY 2018 OCO Plans: N/A					
Title: B/L 2.1 INTEGRATION AND FOT&E TESTING	8.400	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Continue support of NIFC-CA testing. Complete CEC Operational Test (OT-D1A) of AN/USG-2B with Aegis Baseline 9A on USS PRINCETON (CG 59). Complete Operational Test (OT-D1C) of AN/USG-2B with Aegis Baseline 9C on USS JOHN PAUL JONES (DDG 53) and USS ARLEIGH BURKE (DDG 51). Continue Developmental Test (DT-D2) of AN/USG-2B with CVN 78. Commence Developmental Test (DT-D3) of AN/USG-2B with DDG 1000.					
FY 2017 Plans: N/A					
FY 2018 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A ***FY 2018 OCO Plans:*** N/A					
Title: SYSTEM IMPROVEMENTS ***Articles:*** ***FY 2016 Accomplishments:*** Significantly ramp up efforts to meet the rigor of the Advanced Capability Build (ACB16) Preliminary Design Review (PDR); deliver CEC to CSEDS with a CEC system supporting the ACB16 combat system prototype. Coincident with that, integrate with ACB16 updated sensors, find and resolve trouble reports and conduct associated analysis. Continue Common Array Block (CAB) antenna integration efforts to reduce costs, improve reliability, and lower antenna weight will require the creation of below deck Data Distribution System equipment power supply and environmental equipment. Continue robust integration efforts with the ACB 16 combat system build by completing CEC ACB 16 Critical Design Review (CDR) and delivering design for continued developmental/integration testing. Ramp up integration efforts for CEC with the CVN 78 combat system, including nine SSDS and the Dual Band Radar (DBR) Track Exercises that have occurred. Ramp up integration efforts with the DDG 1000 combat system with the Total Ship Computing Environment (TSCE) combat system and the Multi-Function Radar (MFR) including three Track Exercises. ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A	7.233 -	0.000 -	0.000 -	0.000 -	0.000 -
Title: NETWORK ENABLED ELECTRONIC DEFENSE SYSTEM (NEEDS) ***Articles:*** ***FY 2016 Accomplishments:*** Continue analysis, definition and development of NEEDS capability, system architecture and design, external interface requirements, development of prototype implementation, evaluation of real-time processing load, development of WASP capabilities, and development of recorded data playback capability, and support for TIMs, Interface Control Working Groups (ICWG) and In-Process Reviews (IPR). Continue to collect real-world data	7.302 -	0.000 -	0.000 -	0.000 -	0.000 -

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
in Software Integration Laboratory (SIL) to refine initial NEEDS Software Module and update M&S capabilities. Continue to refine Technical Performance Measures (TPM) and CEC Critical Test Integration (CTI) Notebook. ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A					
Title: FIELD ACTIVITIES ***Articles:*** ***FY 2016 Accomplishments:*** Continue field activity support of CEC development and fielding efforts (including SE/IA, Technical Direction Agent, In-Service Engineering, Integrated Logistics Support planning) and program management support. Support ongoing Common Array Block (CAB) Antenna development effort by providing close coordination with shipyards to refine the CAB Antenna fielding plan for both forward-fit and backfit platforms. Participate in discussions to identify and resolve CEC training systems limitations for pier-side Fleet Synthetic Training (FST) events and ensure appropriate CEC configuration after each event. ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A	7.409 -	0.000 -	0.000 -	0.000 -	0.000 -
Title: LINK 16/INTEROPERABILITY ***Articles:*** ***FY 2016 Accomplishments:*** Commence development of Far Term Interoperability Improvement Project (FTIIP) software. Coordinate Development and Integration requirements across all FTIIP programs. Commence integration of FTIIP software. ***FY 2017 Plans:***	5.200 -	0.000 -	0.000 -	0.000 -	0.000 -

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A					
Title: COMMON ARRAY BLOCK (CAB) ANTENNA	15.109	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Conduct Critical Design Review (CDR) and commence build and test of Engineering Development Models (EDMs) of the CAB-Ship antenna. ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A					
Title: NAVAL INTEGRATED FIRE CONTROL-COUNTER AIR (NIFC-CA)	2.457	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Support NIFC CA Increment I refinement against increasingly challenging test cases at White Sands Missile Range (WSMR) and At-Sea with test support, model updates, post-analysis, and software updates. Also begin development of NIFC CA Increment 2 capability with Interface Design Description (IDD) refinement, model updates and development of initial software loads for test at WSMR. Conduct System Functional Review (SFR) and System Requirement Review (SRR). ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:***					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A					
Title: AIR AND MISSILE DEFENSE RADAR (AMDR)	8.762	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Begin robust AMDR Adaptive Layer development, Wrap Around Simulation Program (WASP) development and WASP certification process. Develop CEC AMDR Interface Design Description (IDD). Develop Cooperative Engagement Processor (CEP) Kernel changes and software updates. Assist in development of DT & OT plans. Provide Information Assurance assessment of new CEP interfaces. Support AMDR Joint Test Review (JTR). Develop and deliver initial CEC Sensor Adaptive Layers for all AMDR functions (Surface, Air, etc.). Conduct Trade Studies to determine the DDG-51 Flt III destroyer effort in support of AMDR integration. Install and Check Out AMDR Adaptive Layer Stand Alone CEP (SACEP), remote SACEP, and WASP at the Naval Systems Computing Center (NSCC) in Moorestown, NJ in support of Aegis Combat System Interface Support Equipment (CS ISE) development.					
FY 2017 Plans: N/A					
FY 2018 Base Plans: N/A					
FY 2018 OCO Plans: N/A					
Title: FIRE CONTROL LOOP IMPROVEMENT INITIATIVE (FCLIP) PHASE 2	7.100	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Commence development efforts for Fire Control Loop Improvement Project (FCLIP) phase 2. Coordinate FCLIP improvements with host combat system and other combat system elements. Integrate the updated FCLIP software to accomplish improved air object tracking, to include new interface to Close In Weapon System (CIWS) Sensor and updated interface to the SPQ-9B radar system.					
FY 2017 Plans: N/A					
FY 2018 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	72.472	0.000	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• SCN: *Navy, SCN*	34.100	21.200	30.400	-	30.400	18.100	12.500	12.700	12.800	51.200	507.031
• APN/0204152N: *Navy, APN*	16.263	19.886	16.897	-	16.897	13.788	14.064	14.345	10.974	57.200	397.386
• OPN/2606: *CEC*	25.695	22.034	29.376	-	29.376	31.955	31.932	31.755	32.393	40.774	1,036.578
• RDT&E/0206313M: *USMC*	0.762	2.234	2.092	-	2.092	1.255	0.752	0.730	0.730	0.000	31.177
• RDT&E/0206335M: *USMC*	0.473	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.510
• O&M,N/0206626M: *USMC*	1.725	2.291	3.157	-	3.157	3.062	2.970	2.881	2.881	0.000	28.022
• PMC/0206313M: *USMC*	0.680	7.257	8.450	-	8.450	8.070	3.550	0.000	0.000	0.000	30.711
• OPN/0900: *DDG/MOD*	2.400	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	63.911
• OPN/0960: *CG MOD*	0.000	0.000	0.000	-	0.000	0.000	0.000	6.230	6.355	0.000	12.585

Remarks

D. Acquisition Strategy

CEC Acquisition Strategy (AS) approved by OSD (AT&L) on 19 January 2010. CEC Acquistion Plan (AP) approved September 2013. Full Rate Production for CEC AN/USG-3B variant approved April 2014.

Contracts:
Common Array Block (CAB) antenna - contract competitively awarded 4Qtr FY2013.
CEC Design Agent/Engineering Services (DA/ES) follow-on sole source contract awarded 4Qtr FY2013.
CEC Production - Contract competitively awarded in 2Qtr FY2015.
CEC DA/ES contract will be competitively awarded 1Qtr FY2019.

E. Performance Metrics

- Complete the adaptive layer development for the E-2D aircraft. Provide technical support for installation and integration in the Northrop Grumman Systems Integration Laboratory, on board the test aircraft and support the Developmental testing. Continue E-2D Advanced Hawkeye aircraft CEC integration efforts.
- Continue AEGIS Advanced Capability Builds CEC integration and demonstration efforts.

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- Continue Naval Integrated Fire Control - Counter Air (NIFC-CA) CEC integration and demonstration efforts.
- Continue Crypto Modernization Tech Refresh efforts.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AN/USG-2/3 Design Agent/Engineering Services	C/CPFF	Raytheon : St. Petersburg, FL	120.912	6.858	Feb 2016	0.000		0.000		-		0.000	0.000	127.770	-
TDA	C/CPFF	JHU/APL : Laurel, MD	71.399	6.751	Feb 2016	0.000		0.000		-		0.000	0.000	78.150	-
SI/DA	C/CPAF	General Dynamics : Fairfax, VA	23.979	0.000		0.000		0.000		-		0.000	0.000	23.979	-
SI/DA	C/CPAF	Award Fees : Not Specified	2.903	0.000		0.000		0.000		-		0.000	0.000	2.903	-
DDG 1000	C/CPAF	Raytheon : Massachusetts	10.983	0.000		0.000		0.000		-		0.000	0.000	10.983	-
DDG 1000	C/CPAF	Award Fees : Not Specified	0.447	0.000		0.000		0.000		-		0.000	0.000	0.447	-
NIFC-CA Integration	TBD	Various : Not Specified	39.342	2.457	Jan 2016	0.000		0.000		-		0.000	0.000	41.799	-
In-Service Engineering Activity	WR	NSWC : Port Hueneme, CA	4.638	2.387	Dec 2015	0.000		0.000		-		0.000	0.000	7.025	-
Software Support Activity/ SEIA	WR	NSWC : Dahlgren, VA	17.561	2.720	Dec 2015	0.000		0.000		-		0.000	0.000	20.281	-
Production Engineering Activity	WR	NSWC : Crane, IN	5.694	0.141	Dec 2015	0.000		0.000		-		0.000	0.000	5.835	-
JTRS	TBD	Various : Not Specified	8.500	0.000		0.000		0.000		-		0.000	0.000	8.500	-
Various	TBD	Miscellaneous : Not Specified	29.133	0.000		0.000		0.000		-		0.000	0.000	29.133	-
NAVSSI	WR	SPAWAR : San Diego, CA	0.368	0.000		0.000		0.000		-		0.000	0.000	0.368	-
Certification	MIPR	NSA : Fort Meade, MD	1.200	0.000		0.000		0.000		-		0.000	0.000	1.200	-
Certification	WR	SPAWAR : Charleston, SC	0.930	0.000		0.000		0.000		-		0.000	0.000	0.930	-
Joint Exercises	WR	Various : Not Specified	3.744	0.000		0.000		0.000		-		0.000	0.000	3.744	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
LBTS Testing	WR	CDSA Damneck : Virginia Beach, VA	6.995	0.435	Dec 2015	0.000		0.000		-		0.000	0.000	7.430	-
LBTS Testing	WR	SCSC : Wallops Island, VA	6.383	0.550	Jan 2016	0.000		0.000		-		0.000	0.000	6.933	-
E-2D Integration	TBD	Various : Not Specified	44.258	3.500	Dec 2015	0.000		0.000		-		0.000	0.000	47.758	-
MSI/NCCT	MIPR	Wright Patterson AFB : Dayton, OH	1.228	0.000		0.000		0.000		-		0.000	0.000	1.228	-
Common Array Block Development	C/CPFF	Various : Not Specified	25.452	15.109	Jan 2016	0.000		0.000		-		0.000	0.000	40.561	-
NEEDS	C/CPFF	Various : Not Specified	24.628	7.302	Feb 2016	0.000		0.000		-		0.000	0.000	31.930	-
AMDR	C/CPFF	Various : Not Specified	3.250	8.762	Feb 2016	0.000		0.000		-		0.000	0.000	12.012	-
JTMC	C/CPFF	Raytheon : St. Petersburg, FL	1.000	0.000		0.000		0.000		-		0.000	0.000	1.000	-
FCLIP	C/CPFF	Various : Not Specified	0.000	7.100	Feb 2016	0.000		0.000		-		0.000	0.000	7.100	-
		Subtotal	454.927	64.072		0.000		0.000		-		0.000	0.000	518.999	-

Remarks

Explanations for the use of "WR and Reqn" in the Contract method & type" column are as follows:
- When using "WR", these documents are sent to Navy activities who obligate funding on their vehicles to accomplish tasking for CEC. These activities are the only ones who can accomplish these tasks for the program.
- E-2D Integration/NIFC-CA "Various/TBDs" are for classified programs and several document types.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test/ACB Support	C/CPFF	Raytheon : St. Petersburg, FL	4.098	1.016	Feb 2016	0.000		0.000		-		0.000	0.000	5.114	-
Test/ACB Support	C/CPFF	JHU/APL : Laurel, MD	1.660	1.016	Feb 2016	0.000		0.000		-		0.000	0.000	2.676	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
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Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test Support	WR	NRL : Washington, DC	0.313	0.000		0.000		0.000		-		0.000	0.000	0.313	-
Test/ACB Support	WR	NSWC : Port Hueneme, CA	22.591	1.795	Feb 2016	0.000		0.000		-		0.000	0.000	24.386	-
Air Operations Test Support	WR	NAVAIR (PMA207) : Patuxent River, MD	9.162	1.025	Feb 2016	0.000		0.000		-		0.000	0.000	10.187	-
Test Data Reduction Analysis	WR	NWAS : Corona, CA	16.061	1.873	Feb 2016	0.000		0.000		-		0.000	0.000	17.934	-
Test Support	WR	COMOPTEVFOR : Norfolk, VA	11.456	1.151	Feb 2016	0.000		0.000		-		0.000	0.000	12.607	-
Test/ACB Support	WR	NSWC : Dahlgren, VA	1.766	0.524	Feb 2016	0.000		0.000		-		0.000	0.000	2.290	-
		Subtotal	67.107	8.400		0.000		0.000		-		0.000	0.000	75.507	-

Remarks

Explanation for the use of "WR" in the "Contract method & type" column are as follows:

When using "WR", these documents are sent to Navy activities who obligate funding on their vehicles to accomplish tasking for CEC. These activities are the only ones who can accomplish these tasks for the program.

Test support also includes the following funding for ACB integration support:
FY14 - $3.0M

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	C/FFP	Booz Allen & Hamilton : Washington, DC	5.070	0.000		0.000		0.000		-		0.000	0.000	5.070	-
Program Management Support	C/FFP	Tech Marine Business : Washington, DC	0.360	0.000		0.000		0.000		-		0.000	0.000	0.360	-
		Subtotal	5.430	0.000		0.000		0.000		-		0.000	0.000	5.430	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
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	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	527.464	72.472		0.000		0.000		-		0.000	0.000	599.936	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
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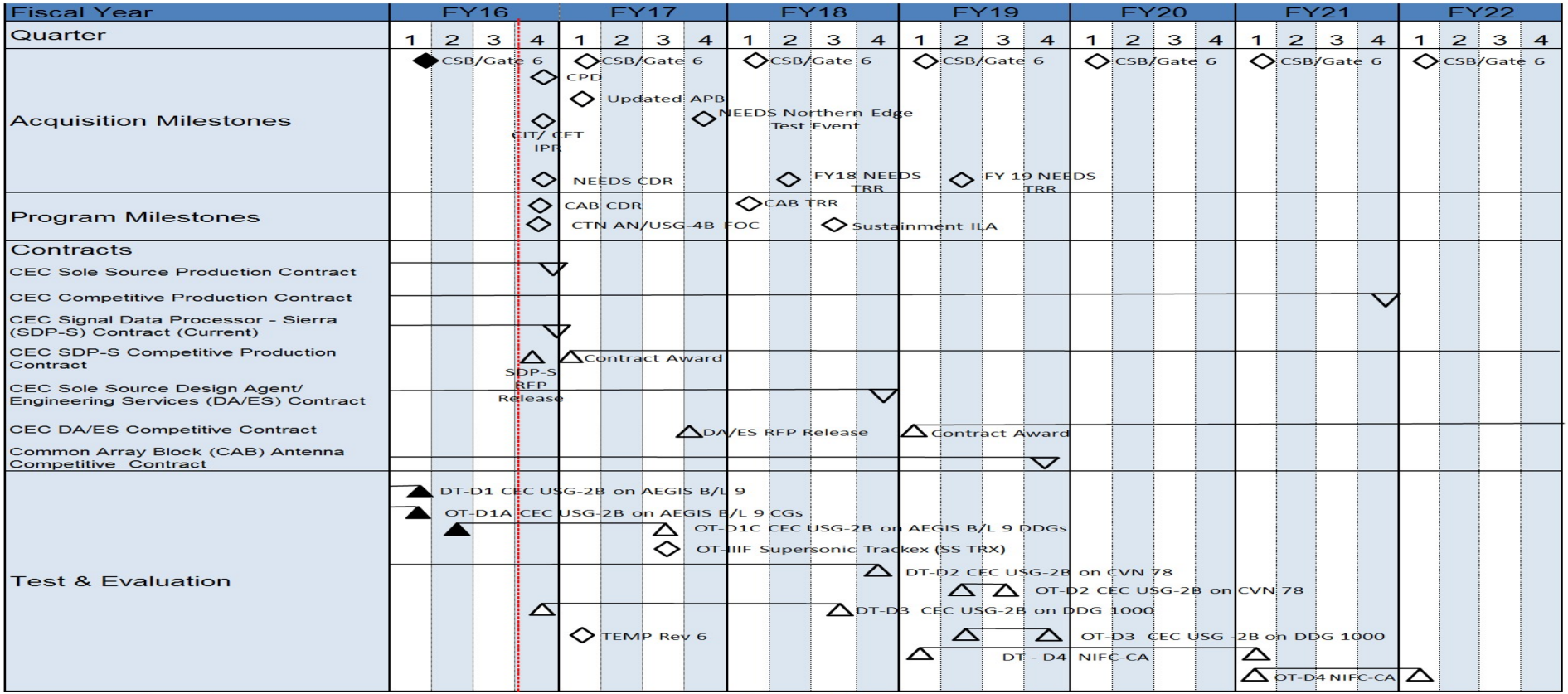

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
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Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2039				
FY16 CSB/Gate 6	1	2016	1	2016
FY17 CSB/Gate 6	1	2017	1	2017
FY18 CSB/Gate 6	1	2018	1	2018
FY19 CSB/Gate 6	1	2019	1	2019
FY20 CSB/Gate 6	1	2020	1	2020
FY21 CSB/Gate 6	1	2021	1	2021
FY22 CSB/Gate 6	1	2022	1	2022
CPD	4	2016	4	2016
Updated APB	1	2017	1	2017
CIT/CET IPR	4	2016	4	2016
NEEDS Northern Edge Test Event	4	2017	4	2017
NEEDS CDR	4	2016	4	2016
FY18 NEEDS TRR	2	2018	2	2018
FY19 NEEDS TRR	2	2019	2	2019
CAB CDR	4	2016	4	2016
CTN AN/USG-4B FOC	4	2016	4	2016
CAB TRR	1	2018	1	2018
Sustainment ILA	3	2018	3	2018
CEC Sole Source Production Contract	1	2016	4	2016
CEC Competitive Production Contract	1	2016	4	2021
CEC Signal Data Processor - Sierra (SDP-S) Contract (Current)	1	2016	4	2016
SDP-S RFP	4	2016	4	2016

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603658N / *Cooperative Engagement*	**Project (Number/Name)** 2039 / *COOP Engagement*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
CEC SDP-S Competitive Production Contract	1	2017	4	2022
CEC Sole Source Design Agent/Engineering Services (DA/ES) Contract	1	2016	4	2018
DA/ES RFP Release	4	2017	4	2017
CEC DA/ES Competitive Contract	1	2019	4	2022
Common Array Block (CAB) Antenna Competitive Contract	1	2016	4	2019
DT-D1 CEC USG-2B on AEGIS B/L 9	1	2016	1	2016
OT-D1A CEC USG-2B on AEGIS B/L 9 CGs	1	2016	1	2016
OT-D1C CEC USG-2B on AEGIS B/L 9 DDGs	2	2016	3	2017
OT-IIIF Supersonic Trackex (SS TRX)	3	2017	3	2017
DT-D2 CEC USG-2B on CVN 78	1	2016	4	2018
OT-D2 CEC USG-2B on CVN 78	2	2019	3	2019
DT-D3 CEC USG-2B on DDG 1000	4	2016	3	2018
OT-D3 CEC USG-2B on DDG 1000	2	2019	4	2019
TEMP Rev 6	1	2017	1	2017
DT-D4 NIFC-CA	1	2019	1	2021
OT-D4 NIFC-CA	1	2021	1	2022

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603713N *I Ocean Engineering Tech Dev*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	121.668	5.135	4.556	8.212	-	8.212	6.021	5.716	5.821	5.930	Continuing	Continuing
0099: *Deep Submergence Bio Med Dev*	30.806	3.934	3.603	4.691	-	4.691	4.616	4.483	4.565	4.652	Continuing	Continuing
0394: *Shallow Depth Diving EQ*	90.862	1.201	0.953	3.521	-	3.521	1.405	1.233	1.256	1.278	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	4.520	4.556	6.455	-	6.455
Current President's Budget	5.135	4.556	8.212	-	8.212
Total Adjustments	0.615	0.000	1.757	-	1.757
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.700	0.000			
• SBIR/STTR Transfer	-0.085	0.000			
• Program Adjustments	0.000	0.000	1.785	-	1.785
• Rate/Misc Adjustments	0.000	0.000	-0.028	-	-0.028

Change Summary Explanation

FY16 - Added $0.7M to support development of submarine rescue diving and recompression system capability which will permit rescue and decompression from a submarine pressurized to 6 atmospheres.

FY18 - Funding increase by $3.656M due to $1.785M additional funding for the Submarine Rescue program [0394] and $1.871M for Navy Diving Biomedical research and equipment [0394 and 0099]. Additional funding for 0394 was added to complete manned testing, sea trials, and obtain certification and IOC for Submarine Rescue Diving and Recompression System (SRDRS) Transfer Under Pressure (TUP). Additional funding for 0099 was added to maintain Deep Submergence Biomedical Development (DSBD) Program that supports multiple undersea capabilities that include the survivability, health and safety of

submarine crews from a disabled submarine as well as Navy divers executing salvage, underwater ship husbandry, underwater construction, explosive ordnance disposal and special warfare missions.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603713N / *Ocean Engineering Tech Dev*	Project (Number/Name) 0099 / *Deep Submergence Bio Med Dev*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0099: *Deep Submergence Bio Med Dev*	30.806	3.934	3.603	4.691	-	4.691	4.616	4.483	4.565	4.652	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 diver underwater continuous noise, impulse noise, and 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.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Deep Submergence Bio Med Dev - Diver Health and Safety	1.967	1.802	2.345	0.000	2.345
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603713N / *Ocean Engineering Tech Dev*	**Project (Number/Name)** 0099 / *Deep Submergence Bio Med Dev*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 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.

FY 2016 Accomplishments:
Executed studies at three Navy laboratories and three university partners in diver decompression sickness prevention, diver thermal underwater exposure mitigation, safe underwater breathing resistance limitation, and repeated underwater high oxygen breathing recommendations. Completed products included guidelines for emergency use of breathing apparatus, guidelines for repeated oxygen exposures of interest to explosive ordnance disposal and naval special warfare, a detailed human calorimeter for evaluating heat loss/gain, and a framework for modeling decompression sickness events of varying severity. These studies are vital to Navy diver occupational health and safety. The university/military relationships have provided synergistic, cost-effective pathways to solutions for difficult operational undersea medical issues.

FY 2017 Plans:
As divers are expected to operate in potentially high risk extreme conditions of cold/warm water at expanding depths and altitudes for longer durations, it is important to continue execution of critical Navy diver occupational health and safety studies to understand the biomedical effects of decompression, thermal loss/gain, oxygen toxicity affecting both a diver's lungs and brain during repeated exposures to elevated pressures. Three university and three Navy laboratory partnerships will continue to mitigate the health dangers associated with diving and submarine rescue with studies including physiological measures of repeated long duration dives, enhanced decompression tables using oxygen, development of a decompression planner for the rescue of disabled submarine (DISSUB) survivors, procedures for oxygen pre-breathing for pressurized DISSUB rescue, development of a toxic gas analyzer for DISSUB rescue, pulmonary oxygen testing for DISSSUB survivors,

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603713N / *Ocean Engineering Tech Dev*	**Project (Number/Name)** 0099 / *Deep Submergence Bio Med Dev*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
saturation dropout studies for increasing survivability from a pressurized DISSUB, decompression studies for altitude diving, and the role of hydration on diver performance. ***FY 2018 Base Plans:*** 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. ***FY 2018 OCO Plans:*** N/A					
Title: Deep Submergence Bio Med Dev - Submarine Rescue	1.967	1.801	2.346	0.000	2.346
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					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603713N / *Ocean Engineering Tech Dev*	**Project (Number/Name)** 0099 / *Deep Submergence Bio Med Dev*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total

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 2016 Accomplishments:
Leveraged studies at three Navy laboratories and three university partners in decompression sickness prevention using decompression, oxygen, and drug intervention to improve the survivability of submariners trapped within or rescued from a disabled submarine. Initiated development of a mass casualty tracking and planning system for safely decompressing submariners from a pressurized disabled submarine. Similar to divers, submariners rescued from a pressurized, disabled submarine must undergo decompression to prevent catastrophic decompression sickness. Therefore the decompression models developed for diving have dual purpose with some alteration.

Continued development and approval of Submarine Decompression System (SDS) products in support of system certification and initial Transfer Under Pressure (TUP) operating capability. Continued development and approval of certification survey plans and testing procedures for unmanned and manned testing. Continued development and refinement of operating and emergency procedures through tabletops and on site operating procedure walkthroughs. Continued hyperbaric life support system safety survey card technical assists to identify system safety certification issues and reduce overall program risk.

FY 2017 Plans:
Continue studies to develop decompression protocols for use with the Submarine Decompression System (SDS) as well as pulmonary oxygen toxicity and carbon dioxide toxicity in a disabled submarine. Investigate decompression protocols for submariners rescued in shallow water where the Navy's submarine rescue vehicle cannot safely attach to the submarine. Develop gas monitors for detecting and measuring toxic gasses in a disabled submarine. Using the results of university models and studies, Navy laboratories will continue to develop plans to mitigate the health dangers associated with decompression and oxygen toxicity (affecting lungs and brains) for rescued submariners and will identify knowledge gaps of expected submariner medical conditions before, during and after rescue from a disabled submarine.

FY 2018 Base Plans:

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603713N / *Ocean Engineering Tech Dev*	**Project (Number/Name)** 0099 / *Deep Submergence Bio Med Dev*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
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. We will continue development of vital decompression, thermal, and oxygen tolerance/toxicity guidance with reengaged university partners to decrease permanent injury in submariners during submarine escape and rescue. University partners are uniquely qualified to conduct smaller scale studies which require significant medical equipment/intervention (e.g. x-rays, MRIs), while Navy laboratories, better suited to for larger scale studies, will provide larger groups of test subjects in unique facilities (e.g. the Navy's Ocean Simulation Facility). Reengaging these university partners in FY-18 is essential to sustaining the very small research base needed to support the survivability, health and safety of submarine crews in a disabled submarine. Navy laboratories (Navy Experimental Diving Unit, Panama City, FL; Naval Submarine Medical Research Laboratory, Groton, CT; Naval Medical Research Center, Bethesda, MD) will continue to exploit the results of university models and outcomes to develop plans to mitigate the risks of decompression sickness, breathing gas toxicity, arterial gas embolism and other medical conditions in the submariners and rescuers aboard a pressurized, disabled submarine or in the SRDRS rescue system. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	3.934	3.603	4.691	0.000	4.691

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603713N / *Ocean Engineering Tech Dev*	**Project (Number/Name)** 0099 / *Deep Submergence Bio Med Dev*

E. Performance Metrics

Quarterly Program Reviews of researcher progress measured against research proposal goals and timelines.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603713N / *Ocean Engineering Tech Dev*	Project (Number/Name) 0394 / *Shallow Depth Diving EQ*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0394: *Shallow Depth Diving EQ*	90.862	1.201	0.953	3.521	-	3.521	1.405	1.233	1.256	1.278	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Shallow Depth Diving EQ - Diving	0.501	0.953	1.747	0.000	1.747
Articles:	-	-	-	-	-

Description: Continued research on contaminated water diving and research on diver thermal protection, C02 monitors and diver sound protection.

FY 2016 Accomplishments:
Continued development of technology to improve diver visual acuity in low visibility water to improve diver safety and effectiveness, thereby minimizing the environments in which divers are ineffective. Initiated performance testing on surface supplied diving systems in cold water environments to fill gaps identified in recent diving mishaps and fatalities.

FY 2017 Plans:
Continue development of technology to improve diver visual acuity in low visibility water to improve diver safety and effectiveness, thereby minimizing the environments in which divers are ineffective. Continue performance testing on surface supplied diving systems in cold water environments to fill gaps identified in recent diving mishaps and fatalities. Initiate corrosion testing on diving umbilicals to identify replacement equipment for umbilical components which failed in service resulting in diving mishaps. Initiate evaluation of diver tracking systems to improve supervisor situational awareness and diver safety.

FY 2018 Base Plans:
Continue development of technology to improve diver visual acuity in low visibility water to improve diver safety and effectiveness, thereby minimizing the environments in which divers are ineffective. Develop design specifications for a highly portable, flexible fabric recompression chamber. This chamber will reduce logistics

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603713N / *Ocean Engineering Tech Dev*	**Project (Number/Name)** 0394 / *Shallow Depth Diving EQ*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
and improve safety by making it easier for expeditionary divers to travel with a small portable life-saving device. The fabric technology development, there is only one manufacturing process believed to be scalable for this effort, is expected to require considerable resources. ***FY 2018 OCO Plans:*** N/A					
Title: Shallow Depth Diving EQ - Submarine Rescue ***Articles:*** ***Description:*** Submarine rescue decompression system permits decompression of submarine crew rescued from a pressurized, disabled submarine of pressures up to 6 atmospheres (ATA). ***FY 2016 Accomplishments:*** Continued development and approval of Submarine Decompression System (SDS) products in support of system certification and initial operating capability. Continued development and approval of certification survey plans and testing procedures for unmanned and manned testing. Continued development and refinement of operating and emergency procedures through tabletops and on site operating procedure walkthroughs. ***FY 2017 Plans:*** To continue support development and conduct unmanned testing of submarine rescue diving and recompression system capability which will permit rescue and decompression from a submarine pressurized to 6 atmospheres. Funding in 2017 will be required and addressed during the execution year through a BTR. ***FY 2018 Base Plans:*** Will complete manned testing, sea trials, certification and IOC for SRDRS TUP. ***FY 2018 OCO Plans:*** N/A	0.700 -	0.000 -	1.774 -	0.000 -	1.774 -
Accomplishments/Planned Programs Subtotals	1.201	0.953	3.521	0.000	3.521

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603713N / *Ocean Engineering Tech Dev*	**Project (Number/Name)** 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. This allows for a variety of projects to be submitted under the same decision process.

Submarine Rescue Systems - prime integration contract is in place and final efforts concluding in FY18.

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.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603721N *I Environmental Protection*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	423.000	19.286	20.343	20.214	-	20.214	23.606	23.703	21.040	21.465	Continuing	Continuing
0401: *Shipboard Waste Mgmt*	342.775	8.390	8.195	7.920	-	7.920	8.989	9.018	9.212	9.399	Continuing	Continuing
0817: *Environmental Sustainability Development (NESDI)*	38.748	5.604	6.822	4.782	-	4.782	6.072	6.266	6.337	6.465	Continuing	Continuing
9204: *Marine Mammal Research*	41.477	5.292	5.326	4.512	-	4.512	5.545	5.419	5.491	5.601	Continuing	Continuing
9205: *Marine Mammal Settlement*	0.000	0.000	0.000	3.000	-	3.000	3.000	3.000	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 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 (MARPOL 73/78), (d) DoD 4715.6 R1, Regulations on Vessels Owned or Operated by the Department of Defense, (e) OPNAV M-5090.1, Environmental and Natural Resources Program Manual,(f) 40 CFR Part 9 and Chapter VII (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) 33 CFR 151 Subpart D-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 supports RDT&E 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 supports RDT&E to develop and validate technologies to enable Navy facilities to comply with environmental laws, regulations, and policies in a cost-effective manner.

The 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) Expand the technology and methods

available to the U.S. Navy marine species monitoring program (3) Preserve core Navy readiness capabilities. The RDT&E efforts funded under the MMR program allow the Navy to avoid or reduce the chances of costly litigation for non-compliance.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	19.289	20.343	20.951	-	20.951
Current President's Budget	19.286	20.343	20.214	-	20.214
Total Adjustments	-0.003	0.000	-0.737	-	-0.737
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.003	0.000			
• Program Adjustments	0.000	0.000	-0.035	-	-0.035
• Rate/Misc Adjustments	0.000	0.000	-0.702	-	-0.702

Change Summary Explanation

The FY 2018 funding request was reduced by $0.212 million to account for the availability of prior year execution balances.

$3.000M added in FY 2018 in accordance with settlement agreement under Marine Mammal Protection Act (new project created).

Technical: Not applicable.
Schedule: Not applicable.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603721N / *Environmental Protection*	Project (Number/Name) 0401 / *Shipboard Waste Mgmt*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0401: *Shipboard Waste Mgmt*	342.775	8.390	8.195	7.920	-	7.920	8.989	9.018	9.212	9.399	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.

The Shipboard Waste Management RDT&E project 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 Holder 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Technical Authority	3.084	2.587	2.410	0.000	2.410
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603721N / *Environmental Protection*	**Project (Number/Name)** 0401 / *Shipboard Waste Mgmt*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Description: Funding in FY17 and FY18 is reduced from FY16 levels to account for reductions in the overall shipboard waste management funding line and support critical needs in the ballast water management area. ***FY 2016 Accomplishments:*** - Reviewed emergent air emission processes and technologies to enable effective compliance at minimal life cycle cost and risk to operations. - Investigated availability and feasibility of rapid water tank residuals treatment technologies. - Reviewed emergent ship oil spills and other discharge violations to determine root cause. - Identified opportunities to reduce the risk of future oil spill violations. - Met with NATO and foreign Navy data exchange partners to leverage lessons learned on afloat environmental compliance. - Worked with Fleet, acquisition programs, and technical authorities to review and provide comments on environmental issues, risks, and opportunities so as minimize the cost and risk to the Navy. - Continued development of environmental equipment/system requirements documentation, design criteria/ guidance, specification standards, and certification protocols. ***FY 2017 Plans:*** - Identify waste management systems for detailed acquisition and evaluation. - Perform studies of rapid water tank design and operation to determine the risk to the environment from residuals and how it may be reduced. - Review emergent ship spills and other discharge violations to determine root cause. - Identify opportunities to reduce the risk of future oil spill violations. - Meet with NATO and foreign Navy data exchange partners to leverage lessons learned on afloat environmental compliance. - 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. - Continue development of environmental equipment/system requirements documentation, design criteria/ guidance, specification standards, and certification protocols. - Investigate impact of the use of environmentally sound refrigerants on refrigeration systems. - Perform assessments of emergent air emission processes and technologies to enable effective compliance at minimal life cycle cost and risk to operations. ***FY 2018 Base Plans:***					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603721N / *Environmental Protection*	**Project (Number/Name)** 0401 / *Shipboard Waste Mgmt*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Assess emergent commercial of the shelf air emissions management processes and technologies to enable effective compliance at minimal life cycle cost and risk to operations. - Identify waste management systems for detailed acquisition and evaluation. - Perform a study of rapid water tank residuals treatment methods and technologies when integrated with tank design and operation. - 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. - Review emergent ship spills and other oil spill discharge violations and determine root causes. - Identify opportunities to reduce the risk of future violations. - Meet with NATO and foreign Navy data exchange partners to leverage lessons learned on afloat environmental compliance. - Continue development of environmental equipment/system requirements documentation, design criteria/ guidance, specification standards, and certification protocols. ***FY 2018 OCO Plans:*** N/A					
Title: Liquid Wastes	2.122	2.050	2.030	0.000	2.030
Articles:	-	-	-	-	-
FY 2016 Accomplishments: - Performed 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. - Identified systems for detailed acquisition and evaluation. Oil Pollution Abatement: - Continued shipboard evaluation of LCS oil water separator. - Performed laboratory testing of commercial off the shelf centrifugal oil water separator. - Completed a full scale laboratory evaluation of electrocoagulation technology for breaking bilgewater emulsions to facilitate oil/water separation. - Developed draft protocols for membrane regeneration. Performed shipboard demonstration of draft protocols on a DDG-51 class ship. Non-Oily Waste:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603721N / *Environmental Protection*	**Project (Number/Name)** 0401 / *Shipboard Waste Mgmt*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Completed laboratory evaluation of a new commercial hydrogen sulfide gas sensor to improve reliability and reduce maintenance. - Performed laboratory evaluation of commercial membrane bioreactor to support procurement specification development. - Performed laboratory evaluation of grease pretreatment subsystem to support procurement specification development - Initiated laboratory evaluation of sludge pretreatment subsystem to support procurement specification development.					
FY 2017 Plans: - 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. Oil Pollution Abatement: - Complete laboratory testing of commercial off-the-shelf oil water separator (OWS). - Prepare for shipboard and Navy ship environmental testing of commercial centrifugal OWS. - Begin development of specifications for Navy centrifugal OWS. - Finalize and document shipboard evaluation of LCS oil water separator. - Develop and document requirements and procedures for regenerating membrane systems. - Begin development of specifications for Navy small ship oil water separator and issue sources sought. - Conduct laboratory performance testing of 10NP/OWMS performance using Navy standard protocol. Non-Oily Waste: - Develop, test and evaluate membrane bioreactor layup and startup procedures and tools. - Evaluate microbial biosensor to assess bioreactor health for maintenance of marine sanitation device. - Perform laboratory evaluation of advanced grease pretreatment subsystem to support procurement specification development. - Initiate long-term assessment of sewage and graywater piping scale development, prevention and cleaning - Complete laboratory evaluation of sludge pretreatment subsystem to support procurement specification development.					
FY 2018 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603721N / *Environmental Protection*	**Project (Number/Name)** 0401 / *Shipboard Waste Mgmt*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- 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 Oil Pollution Abatement: - Initiate shipboard evaluation of centrifugal oil water separator. - Finalize and demonstrate in the Fleet procedures for regenerating membrane systems. - Refine specifications for Navy small ship OWS. - Investigate commercial oil content monitors for potential new discharge standard. Non-Oily Waste: - Complete test and evaluation of membrane bioreactor layup and startup procedures and tools. - Continue evaluation of microbial biosensor to assess bioreactor health. - Complete shipboard evaluation of grease pretreatment system and refine requirements for grease pretreatment for a Navy shipboard system. - Complete documentation for new hydrogen sulfide gas sensor. - Continue long-term assessment of sewage and graywater piping development, prevention and cleaning. - Draft procurement specification for Navy suitable marine sanitation devices. - Issue sources sought based on procurement as specification for Navy ship suitable marine sanitation devices. - Prepare for and initiate shipboard evaluation of grease pretreatment system. ***FY 2018 OCO Plans:*** N/A					
Title: Hazardous Material Control and Management ***Articles:*** ***Description:*** Hazardous Material Control and Management (HMC&M) funding in FY17 was reduced to support critical Ballast Water Management tasking related to acquisition of a commercial treatment system. FY18 funding for HMC&M reflects estimated inflation rates from FY16 and supports the execution of more complex shipboard evaluations in FY18. Unlike FY18, FY17 shipboard evaluations do not require modification of shipboard piping. ***FY 2016 Accomplishments:*** - Performed assessments of hazardous material management processes and pollution prevention technologies that would enable effective compliance at minimal life cycle cost and risk to operations.	1.061 -	1.016 -	1.100 -	0.000 -	1.100 -

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603721N / *Environmental Protection*	**Project (Number/Name)** 0401 / *Shipboard Waste Mgmt*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Revised the NAVSEA Hazardous Material Avoidance Process to include link to health hazard assessments and in-service systems. - Identified, researched, and evaluated less hazardous or non-hazardous substitutes for high-risk hazardous materials. - Assessed universal manual cleaner dispensers to determine Navy ship suitability and reduce costs. - Drafted commercial item description for manual cleaner dispensers. - Identified manual cleaner dispenser candidates suitable for shipboard evaluation. - Completed development of Navy Submarine Hazardous Material Inventory and Management System.					
FY 2017 Plans: - 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. - Identify hazardous material control/pollution prevention systems for detailed acquisition and evaluation. - Issue and provide training on the NAVSEA Hazardous Material Avoidance Process. - Identify, research, and evaluate less hazardous or non-hazardous substitutes for high-risk hazardous materials. - Acquire, install and perform shipboard evaluation of manual cleaner dispensers. - Finalize commercial item description for manual cleaner dispensers. - Identify suitable automatic cleaner dispensers and test in the laboratory. - Draft commercial item description for automatic cleaner dispensers. - Identify automatic cleaner dispensers candidates suitable for shipboard evaluation. - Evaluate Navy Submarine Hazardous Material Inventory and Management System in the Fleet.					
FY 2018 Base Plans: - 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. - Identify hazardous material control/pollution prevention systems for detailed acquisition and evaluation. - Revise the NAVSEA Hazardous Material Avoidance Process. - Identify, research, and evaluate less hazardous or non-hazardous substitutes for high-risk hazardous materials. - Acquire, install and perform shipboard evaluation of automated cleaner dispensers. - Finalize commercial item description for automatic cleaner dispensers.					
FY 2018 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603721N / *Environmental Protection*	**Project (Number/Name)** 0401 / *Shipboard Waste Mgmt*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A					
Title: Solid Waste Management	0.965	0.978	1.039	0.000	1.039
Articles:	-	-	-	-	-

FY 2016 Accomplishments:
- In FY16, Shipboard Waste Management Program Objective Memorandum segregated Solid Waste from the Technical Authority Program.
- Performed 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.
- Acquired shipboard solid waste converter for laboratory evaluation.
- Initiated contract for marine solid waste incinerator (MSWI) for laboratory evaluation.
- Solicitation executed for compact thermal destruction unit (CTDU) suitable for smaller Navy ships for laboratory evaluation.
- Prepared test facility for laboratory evaluation.

FY 2017 Plans:
-Perform extensive full scale laboratory long term endurance testing of shipboard solid waste converter evaluating effectiveness and reliability.
- Acquire and initiate full scale laboratory long term endurance testing of MSWI, evaluating effectiveness and reliability.
- Acquire and perform full scale laboratory long term endurance testing of CTDU, evaluating effectiveness and reliability.
-Provide periodic assessment of performance, reliability, operability, maintainability and Navy ship suitability of laboratory evaluated systems.
- Acquire and evaluate large drum compactor

FY 2018 Base Plans:
- 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.
- Identify solid waste systems for detailed acquisition and evaluation.
- Complete laboratory test and evaluation and prepare final reports on the Act to Prevent Pollution from Ships (APPS) compliant CTDU.
- Begin installation and testing preparation for the shipboard evaluation and Navy ship environmental testing of convertor, MSWI and/or CTDU based on laboratory test results.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603721N / *Environmental Protection*	**Project (Number/Name)** 0401 / *Shipboard Waste Mgmt*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Refine Navy ship acquisition requirements for APPS compliant solid waste processing systems. ***FY 2018 OCO Plans:*** N/A					
Title: Ballast Water Management	0.965	1.368	1.173	0.000	1.173
Articles:	-	-	-	-	-
Description: TA and HMC&M funding in FY17 and FY18 was reduced to support critical Ballast Water Management tasking related to acquisition of a commercial treatment system. ***FY 2016 Accomplishments:*** - Conducted research evaluating ballast water treatment hardware/systems in preparation for anticipated ballast water requirements in DOD Manual 4715.06. - Identified ballast water treatment systems for detailed acquisition and evaluation. - Drafted Navy procedures and criteria for test and evaluation and eventual certification of systems and ship installations. - Identified ballast water treatment system test and evaluation facilities. - Developed ballast water treatment system requirements. - Prepared draft Design Practice Criteria manual for ballast water treatment systems. ***FY 2017 Plans:*** - 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. - Identify systems for detailed acquisition and evaluation. - Acquire a commercial ballast water treatment system for laboratory evaluation. - Perform full scale evaluation of commercial ballast water treatment systems to assess system performance, reliability, operability and maintainability, and suitability as a Navy shipboard system. - Determine ship services, consumables, manning required to run and maintain ballast water treatment systems. - Refine Navy procedures and criteria for test and evaluation and eventual certification of systems and ship installations. - Refine ballast water treatment system requirements. ***FY 2018 Base Plans:*** - 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. - Identify systems for detailed acquisition and evaluation.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603721N / *Environmental Protection*	**Project (Number/Name)** 0401 / *Shipboard Waste Mgmt*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Acquire a commercial ballast water treatment system for laboratory evaluation. - Continue full scale evaluation of a commercial ballast water treatment system to assess system performance, reliability, operability and maintainability, and suitability as a Navy shipboard system. - Determine ship services, consumables, manning required to run and maintain ballast water treatment systems. - Refine Navy procedures and criteria for test and evaluation and eventual certification of systems and ship installations. - Refine ballast water treatment system acquisition specification. - Refine design and installation guidance for meeting ballast water discharge standards requirements. ***FY 2018 OCO Plans:*** N/A					
Title: Non-Copper Antifouling	0.193	0.196	0.168	0.000	0.168
Articles:	-	-	-	-	-
FY 2016 Accomplishments: - In FY16, Shipboard Waste Management Program Objective Memorandum segregated Non-Copper Antifouling from the Technical Authority Program. - Identified advanced antifouling coating systems for test and evaluation. - Prepared samples and executed release rate testing in accordance with standard/ASTM test methods. - Prepared sample and began execution of in-situ testing in accordance with standard test methods. ***FY 2017 Plans:*** - Compare results to release rates associated with legacy, qualified coating systems (copper ablative coatings). - Identify coatings with copper release rates equal to or lower than legacy systems. - Prepare final report with recommendations for follow-on copper release testing. - Continue execution in-situ testing and provide periods reports on performance. - Identify techniques for mitigation of copper discharges from drydocks using a copper-free antifouling topcoat. ***FY 2018 Base Plans:*** - Continue execution in-situ testing and provide periods reports on performance. - Evaluate NAVSEA screening and qualification test requirements for fouling release (with and without biocides) and antifouling coatings. - Identify gaps; develop and execute testing to fill gaps. - 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. - Prepare final report with recommendations.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603721N / *Environmental Protection*	**Project (Number/Name)** 0401 / *Shipboard Waste Mgmt*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Draft qualification procedure modifications as needed. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	8.390	8.195	7.920	0.000	7.920

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-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603721N / *Environmental Protection*	Project (Number/Name) 0817 / *Environmental Sustainability Development (NESDI)*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0817: *Environmental Sustainability Development (NESDI)*	38.748	5.604	6.822	4.782	-	4.782	6.072	6.266	6.337	6.465	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.

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.

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 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.

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.

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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Maximize Training & Testing Requirements Within Environmental Constraints	0.719	1.334	0.850	0.000	0.850
Articles:	-	-	-	-	-
FY 2016 Accomplishments: FY16 funding: - Provided funding for the 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. - Completed new tasks for multi-spectral weapon impact detection system and underwater low environmental impact munitions breaching technology to better characterize environmental impacts of munitions on training ranges and munitions response sites.					
FY 2017 Plans: FY17 funds support 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.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603721N / *Environmental Protection*	**Project (Number/Name)** 0817 / *Environmental Sustainability Development (NESDI)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Increase in funding will support new/continuation of tasks related to multi-spectral weapon impact detection system and underwater low environmental impact munitions breaching technology to better characterize environmental impacts of munitions on training ranges and munitions response sites. - Continue x-ray inspection system to demilitarize targets and analysis of the long-term fate of munitions constituents from unexploded ordnance. ***FY 2018 Base Plans:*** FY18 funds will be applied to: - 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. - Continue underwater low environmental impact munitions breaching technology to better characterize environmental impacts of munitions on training ranges and munitions response sites. - Continue x-ray inspection system to demilitarize targets. ***FY 2018 OCO Plans:*** N/A					
Title: Platform Maintenance and Repair With Minimal Environmental Footprint	1.263	1.376	1.064	0.000	1.064
Articles:	-	-	-	-	-
FY 2016 Accomplishments: FY16 funding was applied to the substantial backlog to: - Completed all aviation sustainment projects related to chrome alternatives and cadmium reductions, and the elimination of overspray in shipbuilding and facilities maintenance operations and projects on trivalent chromium conversion coating-enhanced coloration of aluminum substrates. - Completed tasks for the projects mobile pier facility waste water treatment system and advanced nonchromate primers and coatings. - Completed cadmium and chromium elimination and aqueous cleaning projects. ***FY 2017 Plans:*** - Continue all aviation sustainment projects related to chrome alternatives and cadmium reductions, continue the elimination of overspray in shipbuilding and facilities maintenance operations. - Continue low volatile organic compound, low hazardous air pollutant wipe solvent and paint thinner validation, trivalent chromium conversion coating enhanced coloration of aluminum substrates, non-isocyanate					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
polyurethane free formulation for aircraft and support equipment, and multi-functional surface preparation technology for maintenance painting in shipyards. ***FY 2018 Base Plans:*** FY18 funds will be applied to: - Continue aviation sustainment projects related to chrome alternatives and cadmium reductions. - Continue the elimination of overspray in shipbuilding and facilities maintenance operations. - Continue non-isocyanate polyurethane free formulation for aircraft and support equipment, and multi-functional surface preparation technology for maintenance painting in shipyards. ***FY 2018 OCO Plans:*** N/A					
Title: Support Shore Readiness within Environmental Constraints	1.939	1.833	1.187	0.000	1.187
Articles:	-	-	-	-	-
FY 2016 Accomplishments: - Completed tasks that provided systems and processes to minimize regulated emissions, discharges and hazardous material usage resulting specifically from waterfront support, aviation support, and other base operations. Completed oil boom fouling control. - Completed dry dock sediment management, treatment of ship heavy metal contaminated oily waste and the evaluation of compliance options for NPDES permits for cooling water intake structures. ***FY 2017 Plans:*** - Continue providing systems and processes to minimize regulated emissions, discharges and hazardous material usage resulting specifically from waterfront support, aviation support, and other base operations. -Continue biofouling reduction of ship cooling water systems, closed-loop cooling water system to accommodate ship cooling water needs, evaluation of compliance options for Clean Water Act permits for cooling water intake structures, optimization of ship to shore regulated garbage management, improved dewatering of dredge sediment, diverless deployment system for in-situ sediment samplers, and quantification of Polychlorinated Biphenyl (PCB) paint volatilization from ship cutting operations. ***FY 2018 Base Plans:*** FY18 funds will be applied to: - Continue providing systems and processes to minimize regulated emissions, discharges and hazardous material usage resulting specifically from waterfront support, aviation support, and other base operations.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603721N / *Environmental Protection*	**Project (Number/Name)** 0817 / *Environmental Sustainability Development (NESDI)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- 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. ***FY 2018 OCO Plans:*** N/A					
Title: Cost-Effective Management of Environmental Regulatory Requirements	1.683	2.279	1.681	0.000	1.681
Articles:	-	-	-	-	-
FY 2016 Accomplishments: FY16 funding: - Provided validated knowledge, models, processes and systems to improve environmental monitoring and reporting, and reduce the cost of compliance with regulations applicable to coastal contamination and contaminated sediments. - Completed tasks for sustainable remediation of low pH aquifers and aquifers with a continuing contaminant source using proton reduction technology, aerobic bio-augmentation for remediation of RDX contaminated groundwater, reduce the cost of compliance with coastal contamination and contaminated sediment and demonstration of improved method for quantifying algae biomass to meet nutrient numeric endpoint permit compliance. - Completed projects for coral reef assessment technology, vapor intrusion prevention and improved treatment of contaminated storm-water. ***FY 2017 Plans:*** FY17 funds support validated knowledge, models, processes and systems to improve environmental monitoring and reporting, and reduce the cost of compliance with regulations applicable to coastal contamination and contaminated sediments. - In compliance with environmental policy and regulations, funding supports storm-water sampling and treatment demonstrations, perfluorochemicals from DoD sites conceptual site model development, autonomous benthic ecology monitoring system, and management tools for radiological compounds in environmental media. - Provide funding for coral reef assessment technology project, vapor intrusion prevention and improved treatment of contaminated storm-water. ***FY 2018 Base Plans:*** FY18 funds will be applied to:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603721N / *Environmental Protection*	**Project (Number/Name)** 0817 / *Environmental Sustainability Development (NESDI)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- 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. - Continue stormwater sampling and treatment demonstrations, perfluorochemicals from DoD sites conceptual site model development and treatment study, autonomous benthic ecology monitoring system, and management tools for radiological compounds in environmental media. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	5.604	6.822	4.782	0.000	4.782

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 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-2A, RDT&E Project Justification: FY 2018 Navy										Date: May 2017		
Appropriation/Budget Activity 1319 / 4					R-1 Program Element (Number/Name) PE 0603721N / *Environmental Protection*				Project (Number/Name) 9204 / *Marine Mammal Research*			
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
9204: *Marine Mammal Research*	41.477	5.292	5.326	4.512	-	4.512	5.545	5.419	5.491	5.601	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 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**
Title: Marine Ecology and Population Dynamics	0.707	0.871	0.815	0.000	0.815
Articles:	-	-	-	-	-
FY 2016 Accomplishments:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603721N / *Environmental Protection*	**Project (Number/Name)** 9204 / *Marine Mammal Research*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Continued research on ecosystems status and habitat use by marine species of Navy interest; sensor and tag development; with a priority emphasis on the population structure of beaked whales in the vicinity of Navy training ranges. Worked with the Navy Marine Species Density data program to develop tools and methods to improve the abundance estimates and density distribution data, consistent with the best standards of the expert community.					
FY 2017 Plans: Funding within this topic area will increase slightly in FY17 to continue research on the ecology and habitat of marine species of Navy interest, with a priority emphasis on the population structure of beaked whales and other sound sensitive species in the vicinity of Navy training ranges. Continue to develop tools and methods to improve the abundance estimates and density distribution data including passive acoustic based density estimates, consistent with the best standards of the expert community. Two additional projects that were delayed in FY15 and FY16 will allow the development of new tools to assess the population size and study marine mammal habitat necessary for Navy environmental compliance in southern California. These projects will enable the Fleets and SYSCOMS to collect future data required for environmental compliance at reduced costs. Funding in this topic areas, allows the Navy to meet environmental compliance requirements for impact analysis and avoid costly litigation. Funding in this topic area is particularly important because baseline habitat and movement patterns were a focus of litigation for the HSTT EIS. Plaintiffs sued the Navy for not adequately identifying and avoiding biologically important areas to marine mammals. Continued funding in these topic areas is necessary to support future compliance documents and is also a requirement of a settlement agreement with the California Coastal Commission for the Hawaii - Southern California Training and Testing (HSTT) EIS/OEIS. Any reduction in funding would result in non-compliance with the settlement agreement and would subject the Navy to costly litigation.					
FY 2018 Base Plans: Funding within this topic area will decrease slightly in FY18 to continue research on the ecology and habitat of marine species of Navy interest, with a priority emphasis on the population structure of beaked whales and other sound sensitive species in the vicinity of Navy training ranges. Continue to develop tools and methods to improve the abundance estimates and density distribution data including passive acoustic based density estimates, consistent with the best standards of the expert community. These projects will enable the Fleets and SYSCOMS to collect future data required for environmental compliance at reduced costs. Funding in this topic					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603721N / *Environmental Protection*	**Project (Number/Name)** 9204 / *Marine Mammal Research*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
areas, allows the Navy to meet environmental compliance requirements for impact analysis and avoid costly litigation. ***FY 2018 OCO Plans:*** N/A					
Title: Criteria and Thresholds, Physiology and Behavior, and Effects of Sound	1.760	2.732	2.486	0.000	2.486
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Funding applied to the required focus area supported the refinement of criteria and thresholds for our at-sea training and testing permits which are required in FY18. Projects are often 1-2 year efforts and must be initiated in FY16 or they would jeopardize the ability to obtain authorization from regulatory agencies to conduct training and testing activities. Additional funding was required for the Navy's Southern California Behavioral Response project to support the close out and final analysis of field data collected over the past five years. Overall, the program continued research to determine what constitutes biologically significant behavioral response to Navy-generated sound on individuals with respect to the disruption of natural behavior patterns, ascertaining the short and long-term effects of such disruptions and documenting avoidance behaviors. Research regarding anatomically derived hearing properties for large whales continued since this is a priority of the regulator. Funding in these focus areas allowed the Navy to meet environmental compliance requirements for impacts analysis and avoid costly litigation.					
FY 2017 Plans: Funding within this topic area will increase significantly in FY17 to continue to support research necessary to develop new criteria and thresholds for our Phase IV permits. These criteria and thresholds will need to be negotiated with the regulatory agencies in 2020. Since Projects are often 3-5 year efforts, they must be initiated and/or continued in FY17 in order to support this deadline. Any delay or reduction in funding in FY17 would jeopardize the Navy ability to develop appropriate criteria and thresholds needed to obtain authorization from regulatory agencies to continue to conduct training and testing activities. Additional funding is also required for the Navy Southern California Behavioral Response Study to support the additional year of effort that resulted from reduced funding in FY15. Funding in FY17 will support the analysis/synthesis of field data collected over the past five years and the development of a summary report on the behavioral effects of tactical sonar on marine mammals. Overall, the program will continue research to determine what constitutes behavioral response to Navy-generated sound on individuals with respect to the disruption of natural behavior patterns, and studying the short and long-term effects of such disturbance. Funding in this topic area is particularly important because					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603721N / *Environmental Protection*	**Project (Number/Name)** 9204 / *Marine Mammal Research*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
of criteria and thresholds the effect of behavioral harassment on marine mammals are the focus litigation against Navy training and testing activities. Continued funding in these topics areas is a requirement of a settlement agreement with the California Coastal Commission for the Hawaii - Southern California Training and Testing (HSTT) EIS/OEIS. Any reduction in funding would result in non-compliance with the settlement agreement and would subject the Navy to costly litigation. ***FY 2018 Base Plans:*** Funding within this topic area will decrease slightly in FY18 to continue to support research necessary to develop new criteria and thresholds for our Phase IV permits. These criteria and thresholds will need to be negotiated with the regulatory agencies in 2020. Since Projects are often 3-5 year efforts, they must be initiated and/or continued in FY18 in order to support this deadline. Any delay or reduction in funding in FY18 would jeopardize the Navy ability to develop appropriate criteria and thresholds needed to obtain authorization from regulatory agencies to continue to conduct training and testing activities. Overall, the program will continue research to determine what constitutes behavioral response to Navy-generated sound on individuals with respect to the disruption of natural behavior patterns, and studying the short and long-term effects of such disturbance. Funding in this topic area is particularly important because of criteria and thresholds the effects of behavioral harassment on marine mammals are the focus litigation against Navy training and testing activities. Continued funding in these topics areas is a requirement of a settlement agreement with the California Coastal Commission for the Hawaii - Southern California Training and Testing (HSTT) EIS/OEIS. Any reduction in funding would result in non-compliance with the settlement agreement and would subject the Navy to costly litigation. ***FY 2018 OCO Plans:*** N/A					
Title: Mitigation Methodologies: Monitoring, New Technology, and Risk Assess	2.825	1.723	1.211	0.000	1.211
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Supported our ongoing permit requirements to monitor the effects of at-sea training and testing activities, increased investment is required in this focus area to remain in compliance. Overall, the MMR program continued to fund monitoring capabilities of marine animals to include the development of new technologies and improvements to existing technologies. In particular, investment in the use of UUV and AAVs increased as these platforms have recently become more mature and are able to be leveraged to meet monitoring requirements with some modifications to their hardware. MMR Program completed the refinement of the High-Frequency Recording Package (HARP) which is our most common passive acoustic recording system in Navy-wide use for acoustic monitoring. Improvements to this system increased the duration of deployments, increased the					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603721N / *Environmental Protection*	**Project (Number/Name)** 9204 / *Marine Mammal Research*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
bandwidth and accuracy of recordings and reduce lifecycle maintenance costs. Increased funding in FY16 accelerated the transition of new or improved lower cost monitoring technologies to the Fleets and SYCOMs to reduce the impacts on readiness activities that current monitoring and mitigation technologies have. ***FY 2017 Plans:*** Funding within this topic area will decrease in FY17 as a result of the intended transition of costs associated with aspects of the M3R system to the Fleets and SYSCOMS and a shift in priority to accelerate projects funded under the Criteria and Thresholds, Physiology and Behavior, and Effects of Sound topic. To support our ongoing permit requirements to monitor the effects of at-sea training and testing activities, continued investment is required in this focus area to remain in compliance. Overall, the MMR program will continue to fund monitoring capabilities of marine animals to include the development of new technologies and improvements to existing technologies. In particular, investment in the use of UUV and AAVs will increase as these platforms have recently become more mature and are able to be leveraged to meet monitoring requirements with some modifications to their hardware. The Navy is also working to refine the High-Frequency Recording Package (HARP) which is our most common passive acoustic recording system in Navy-wide use for acoustic monitoring. Improvements to this system will increase the duration of deployments, increase the bandwidth and accuracy of recordings, and reduce lifecycle maintenance costs. Continued funding in FY17 will be used to accelerate the transition of new or improved lower cost monitoring technologies to the Fleets and SYCOMs to reduce the impacts on readiness activities that current monitoring and mitigation technologies have. Funding in this topic area is particularly important because of the Navy lack of additional mitigation tools beyond lookouts were a focus of litigation for the HSTT EIS. Continued funding in these topics areas is necessary to support future compliance documents and is also a requirement of a settlement agreement with the California Coastal Commission for the Hawaii - Southern California Training and Testing (HSTT) EIS/OEIS. Any reduction in funding would result in non-compliance with the settlement agreement and would subject the Navy to costly litigation. ***FY 2018 Base Plans:*** Funding within this topic area will decrease slightly in FY18. To support our ongoing permit requirements to monitor the effects of at-sea training and testing activities, continued investment is required in this focus area to remain in compliance. Overall, the MMR program will continue to fund monitoring capabilities of marine animals to include the development of new technologies and improvements to existing technologies. In particular, investment in the use of PAM technologies will increase as these platforms become more mature and are able to be leveraged to meet monitoring requirements. Continued funding in FY18 will be used to accelerate the transition of new or improved lower cost monitoring technologies to the Fleets and SYCOMs to reduce the impacts on readiness activities that current monitoring and mitigation technologies have. Funding in this					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603721N / *Environmental Protection*	**Project (Number/Name)** 9204 / *Marine Mammal Research*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
topic area is particularly important because of the Navy lack of additional mitigation tools beyond lookouts were a focus of litigation for the HSTT EIS. Continued funding in these topics areas is necessary to support future compliance documents and is also a requirement of a settlement agreement with the California Coastal Commission for the Hawaii - Southern California Training and Testing (HSTT) EIS/OEIS. Any reduction in funding would result in non-compliance with the settlement agreement and would subject the Navy to costly litigation. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	5.292	5.326	4.512	0.000	4.512

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-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603721N / *Environmental Protection*	Project (Number/Name) 9205 / *Marine Mammal Settlement*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
9205: *Marine Mammal Settlement*	0.000	0.000	0.000	3.000	-	3.000	3.000	3.000	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: MARINE MAMMAL SETTLEMENT	0.000	0.000	3.000	0.000	3.000
Articles:	-	-	-	-	-
FY 2016 Accomplishments: N/A					
FY 2017 Plans: N/A					
FY 2018 Base Plans: The "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" research topic will be funded at minimum $2.5 million per year for each of the three fiscal years and will be managed jointly and by mutual agreement by Navy and NOAA. This may include: a) deployment of calibrated passive acoustic recording devices in acoustic habitats, including in National Marine Sanctuaries (NMS) and high risk					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603721N / *Environmental Protection*	**Project (Number/Name)** 9205 / *Marine Mammal Settlement*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
areas in the U.S. territorial sea and U.S. Exclusive Economic zone. Choices of sites may vary from year to year. Archiving of all data should occur within federal, publicly accessible, passive acoustic data archives at the National Centers for Environmental Information. In support of the "marine mammal density and distribution modeling in data-poor areas" research topic, a multi-year working group will be established to coordinate the advancement of density spatial modeling methods using visual and acoustic survey data among the federal agencies. The working group will identify and address priority issues in modeling that are common to federal agencies and academic researchers. This effort will include stakeholder involved with end-users including environmental NGOs and subject-matter experts on marine species. This project will receive approximately $250-350K in funding per year, up to a total of $1M over the course of the three year funding period. The project "support the identification of areas of biological importance" will receive a one-time funding contribution of approximately $300K to NOAA. This project will consist of convening an expert working group in FY20 to conduct a rigorous elicitation process to attempt to identify important biological areas for marine mammals using the best available data, including but not limited to any marine mammal density estimates or data developed under this agreement. The "density data collection" topic will receive any remaining funding available from the $9M after the other topics have been funded. This may range from $100-200K per year. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.000	0.000	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-2, RDT&E Budget Item Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603724N *I Navy Energy Program*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	270.885	54.911	27.479	50.623	-	50.623	51.385	51.945	53.722	54.722	Continuing	Continuing
0829: *ENERGY CONSERVATION (ADV)*	59.467	8.216	5.065	10.080	-	10.080	11.281	11.485	12.644	12.894	Continuing	Continuing
0838: *Mobility Fuels (ADV)*	66.862	12.191	8.100	12.801	-	12.801	12.243	12.400	12.653	12.905	Continuing	Continuing
0928: *Shore Energy Technology*	48.733	1.519	1.025	2.732	-	2.732	2.884	2.922	2.961	2.951	Continuing	Continuing
0996: *Aircraft Energy Conservation*	95.823	20.916	13.289	25.010	-	25.010	24.977	25.138	25.464	25.972	Continuing	Continuing
9999: *Congressional Adds*	0.000	12.069	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	12.069

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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	56.391	52.479	50.613	-	50.613
Current President's Budget	54.911	27.479	50.623	-	50.623
Total Adjustments	-1.480	-25.000	0.010	-	0.010
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.480	0.000			
• Program Adjustments	0.000	-25.000	0.063	-	0.063
• Rate/Misc Adjustments	0.000	0.000	-0.053	-	-0.053

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603724N *I Navy Energy Program*

Congressional Add Details ($ in Millions, and Includes General Reductions)

	FY 2016	FY 2017
Project: 9999: *Congressional Adds*		
Congressional Add: *Navy Energy Increase*	12.069	0.000
Congressional Add Subtotals for Project: 9999	12.069	0.000
Congressional Add Totals for all Projects	12.069	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.

0838 - FY 2017 by $4.873M. Due to reduction Generation 4 Protocol was removed from schedule and Alternative Fuel Evaluations will complete at the end of FY17. Advanced BioFuel Testing ended 2nd QTR of FY17. Evaluate and Maintain compatibility with commercial aviation fuel specs was added as the program continues to support commercial compatibility.

0996 - FY 2017 by $14.586M. Due to reduction Mission Planning Upgrade was ended QTR2 of FY17.

The FY 2018 funding request was reduced by $0.937 million to account for the availability of prior year execution balances.

Technical: Not applicable.

Financial: $25.000 million reduction due to a shift in Department of the Navy (DoN) priorities and an urgent requirement to address emergent, critical unfunded requirements in FY17 . The reduction aligns Energy program funding to the previous amounts executed prior to FY2011.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603724N / *Navy Energy Program*	Project (Number/Name) 0829 / *ENERGY CONSERVATION (ADV)*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0829: *ENERGY CONSERVATION (ADV)*	59.467	8.216	5.065	10.080	-	10.080	11.281	11.485	12.644	12.894	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Hull Hydrodynamic Sub Project	0.406	0.114	1.144	0.000	1.144
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 2016 Accomplishments: Post availability performance trial (powering and maneuvering) to evaluate performance of bow bulb installation on KIDD was delayed until FY18 due to changing the installation from DDG 100 to DDG 103. Completed bow bulb fabrication and performed laser scan to validate fabrication within drawing tolerances. Conducted layup and storage of bow bulb for installation on DDG 103 in FY17. Worked with stakeholders to identify alternate ship for installation and ultimately chose DDG 103. Continue to identify additional energy saving/capability improvement technologies in Hull Hydrodynamic systems and prepare proposals and business case analyses for promising technologies with potential to reduce fossil fuel consumption.					
FY 2017 Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0829 / *ENERGY CONSERVATION (ADV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Due to FY 17 program reduction of $4.609M bow bulb installation on DDG 103 was cancelled. Planning was reduced to minimum effort in the event other funding is identified for installation. Task to investigate optimum trim for various classes on ships as an energy savings measure was stopped. ***FY 2018 Base Plans:*** Conduct post installation acoustic, and performance sea trial of bow bulb to assess performance. Provide interim and final bow bulb trial report. Continue to identify additional energy saving/capability improvement technologies in Hull Hydrodynamic domain to reduce drag and prepare proposals and business case analyses for promising technologies with potential to reduce fossil fuel consumption. ***FY 2018 OCO Plans:*** N/A					
Title: Heating , Ventilation and Air Conditioning (HVAC) Sub Project ***Articles:*** ***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. ***FY 2016 Accomplishments:*** Completed LHD Thermal Management Control System (TMCS) laboratory testing of system and in process of installing on board LHD 2 for test and evaluation. Providing oversight of installation on LHD 2 during FY 16 availability scheduled to end Nov 2016. Continue to identify additional energy saving/capability improvement technologies in HVAC Systems and prepare proposals and business case analyses for promising technologies with potential to reduce fossil fuel. ***FY 2017 Plans:*** Post installation testing of TMCS on LHD 2 is in progress and Subject Matter Expert will prepare report with recommendations for class-wide implementation. Continuing to identify additional energy saving/capability improvement technologies in HVAC Systems and preparing proposals and business case analyses for promising technologies with potential to reduce fossil fuel. ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:***	2.258 -	0.240 -	0.000 -	0.000 -	0.000 -

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0829 / *ENERGY CONSERVATION (ADV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A					
Title: Thermal Management Sub Project	0.000	0.000	0.850	0.000	0.850
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 and reduce the shipboard electrical demand on HVAC systems. ***FY 2016 Accomplishments:*** N/A ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** Investigate exploration of waste heat technologies and methods for shipboard application. Expand scope of effort to include thermo-electric generation integration with shipboard systems and develop potential design applications and test requirements. 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. ***FY 2018 OCO Plans:*** N/A					
Title: Propulsion Systems Sub Project	0.000	0.114	0.386	0.000	0.386
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. ***FY 2016 Accomplishments:*** N/A ***FY 2017 Plans:***					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0829 / *ENERGY CONSERVATION (ADV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Podded propulsion study is only partially funded due to program reduction with only minimum effort limited to compiling feasible pod configurations. ***FY 2018 Base Plans:*** Continue efforts begun in FY17 and, as feasible, develop design requirements and identify potential ship class applications for Navy ships and plan going forward. Continue to identify additional energy saving/capability improvement technologies in Propulsion Systems and prepare proposals and business case analyses for promising technologies with potential to reduce fossil fuel. ***FY 2018 OCO Plans:*** N/A					
Title: Electrical Systems SubProject ***Articles:*** ***Description:*** 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 consumption. ***FY 2016 Accomplishments:*** N/A ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** Investigate Micro-Grid technology for shipboard application and its potential to assist in managing the shipboard energy magazine and its impact for improving support of mission capability. Investigate other technologies that impact shipboard energy profile or assist in managing shipboard electrical distribution systems such as Non-Intrusive Load Monitoring (NILM). Continue to identify additional energy saving/capability improvement technologies in Electrical Systems and prepare proposals and business case analyses for promising technologies with potential to reduce fossil fuel. ***FY 2018 OCO Plans:*** N/A	0.000 -	0.000 -	0.579 -	0.000 -	0.579 -
Title: Auxiliary Systems Sub Project ***Articles:***	0.250 -	0.209 -	0.556 -	0.000 -	0.556 -

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0829 / *ENERGY CONSERVATION (ADV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Description: Auxiliary Systems Sub Project -- Project funds will be utilized to identify, test and evaluate new technologies for shipboard auxiliary systems aimed at reducing fuel consumption. ***FY 2016 Accomplishments:*** Installation of Advanced Reverse Osmosis (ARO) system in USS COMSTOCK (LSD 45) scheduled in February 2016 had to be rescheduled due to a change in the ship schedule and an alternate ship, USS CARTER HALL (LSD 50), has been selected. All ARO equipment qualification testing has been completed and ship installation drawings are being updated to reflect alternate ship. Conduct installation and testing of ARO in LSD 50 and provide performance evaluation report. Continue to identify additional energy saving/capability improvement technologies in auxiliary systems and prepare proposals and business case analyses for promising technologies with potential to reduce fossil fuel. ***FY 2017 Plans:*** Installation of ARO in LSD 50 originally scheduled to begin Nov 16 was delayed until Jan 2017due to the ship schedule. Funding supports the testing and reporting of results for ARO and for the partial completion of a Variable Speed Drive study that has to be stopped due to the FMB withhold. ***FY 2018 Base Plans:*** Based on prior year installation and evaluation of ARO on LSD class ship develop design, testing and installation plans for extending this technology to LPD 17 Class ship for evaluation. Effort will include design, material procurement, land-based testing as required, drawing development and selection of ship for installation and test. Continue to identify additional energy saving/capability improvement technologies in auxiliary systems and prepare proposals and business case analyses for promising technologies with potential to reduce fossil fuel. ***FY 2018 OCO Plans:*** N/A					
Title: Underwater Hull Husbandry Sub Project ***Articles:***	0.000 -	0.000 -	0.139 -	0.000 -	0.139 -
Description: Hull Husbandry Sub Project - Project funds will be utilized to identify and evaluate new underwater hull/propeller coating systems and underwater hull cleaning and maintenance techniques to reduce hydrodynamic drag on the hull and thereby increase fuel efficiency. ***FY 2016 Accomplishments:***					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** Investigate Navy Bio-Fouling initiatives aimed at developing maintenance strategies and anti-fouling coatings for the hulls and propellers of Navy ships as part of a comprehensive bio-fouling program. Continue to identify additional energy saving/capability improvement technologies in Underwater Hull Husbandry domain to reduce drag and prepare proposals and business case analyses for promising technologies with potential to reduce fossil fuel consumption. ***FY 2018 OCO Plans:*** N/A					
Title: Energy Monitoring & Assessment	5.302	4.388	6.426	0.000	6.426
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. ***FY 2016 Accomplishments:*** Continued Global Energy Information System (GENISYS) development efforts and establishment as Program of Record for Fleet Energy Conservation Dashboard (FECD), Vessel Fuel Utilization Tool (VFUT), Shipboard Energy Assessment System (SEAS), and Electronic Logbooks (eLogBook) aimed at supporting a CY 16 GGF demonstration and initial integration of energy monitoring capability for fleet assets. Completed installation and conducting post installation evaluation of the TRITON Hull Assessment Tool installed in DDG 102 and monitoring performance. Monitoring performance of Shipboard Energy Dashboard (SED) installed in LPD 25 and finalizing Energy Summary Report format for stakeholder review. Reviewing eRM requirements as they relate to energy as the program transitions to a Program of Record as the next generation of the Integrated Condition Assessment System (ICAS). Providing 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 to identify additional energy saving/capability					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
improvement technologies and monitoring methodologies and prepare proposals and business case analyses for promising technologies with potential to reduce fossil fuel. ***FY 2017 Plans:*** 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 of FECD, VFUT, SEAS, and eLogBooks to support future fleet-wide implementation. Continue monitoring shipboard installation of TRITON and provide final report with recommendations for 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. ***FY 2018 Base Plans:*** 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 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. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	8.216	5.065	10.080	0.000	10.080

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: FY 2018 Navy		Date: May 2017
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	C/CPAF	NAVSEA HQ : Washington, DC	0.000	0.000	Jan 2016	0.245	Jan 2017	0.440	Jan 2018	-		0.440	0.000	0.685	-
Systems Engineering	WR	NSWC DD : Dahlgren, MD	0.000	0.000		0.000	Nov 2016	0.000		-		0.000	0.000	0.000	-
Systems Engineering	WR	NSWC PHila : Philadelphia, PA	0.000	0.821	Jan 2016	0.132	Nov 2016	1.806	Nov 2017	-		1.806	0.000	2.759	-
Primary Hardware Development	WR	NSWC Carderock : Bethesda, MD	8.983	0.000	Jan 2016	0.410	Nov 2016	0.000		-		0.000	0.000	9.393	-
Systems Engineering	WR	NSWC PHD : Port Hueneme, CA	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
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	0.000		0.000		0.681	Dec 2017	-		0.681	0.000	8.529	-
Demonstration & Evaluation	WR	NSWC Carderock : Bethesda, MD	7.383	0.766	Jan 2016	0.000		0.000		-		0.000	0.000	8.149	-
System Development	C/BOA	NAWC-AD : Lakehurst, NJ	0.000	0.000		1.300	Jan 2017	2.317	Jan 2018	-		2.317	0.000	3.617	-
		Subtotal	30.849	1.587		2.087		5.244		-		5.244	0.000	39.767	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Support	WR	NSWC Carderock : Bethesda, MD	2.700	0.143	Jan 2016	0.000		0.413	Jan 2018	-		0.413	Continuing	Continuing	Continuing
Software Support	WR	NSWC Carderock : Bethesda, MD	0.450	0.072	Jan 2016	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
Study Anaylsis	WR	NSWC Carderock : Bethesda, MD	1.174	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
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Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Support	C/CPAF	NSWC SSES : Philadelphia, PA	0.000	0.878	Jan 2016	0.000		0.220	Jan 2018	-		0.220	0.000	1.098	-
Development Support	C/CPAF	NAVSEA HQ : Washington, DC	0.000	0.100	Jan 2016	0.867	Oct 2017	0.677	Feb 2018	-		0.677	0.000	1.644	-
Software Support	C/CPAF	NSWC SSES : Philadelphia, PA	0.000	0.281	Jan 2016	0.000		0.000		-		0.000	0.000	0.281	-
Software Support	C/CPAF	NAVSEA HQ : Washington, DC	0.000	1.200	Jan 2016	0.000		0.000		-		0.000	0.000	1.200	-
Development Support	WR	NSWC PHila : Philadelphia, PA	0.000	0.000		0.124	Nov 2016	0.781	Dec 2017	-		0.781	0.000	0.905	-
		Subtotal	5.524	2.674		0.991		2.091		-		2.091	-	-	-

Remarks

FY16 majority Development and Software support will move to NAVSEA/NSWC SSES from NSWC Carderock.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	NSWC Carderock : Bethesda, MD	9.961	0.000	Feb 2016	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Operational Test & Evaluation	WR	NSWC Carderock : Bethesda, MD	6.678	1.697	Feb 2016	0.179	Nov 2016	0.682	Nov 2017	-		0.682	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 SSES : Philadelphia, PA	0.000	0.383	Feb 2016	0.000		0.000		-		0.000	0.000	0.383	-
Operational Test & Evaluation	WR	NSWC Caderock : Bethesda, MD	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
Developmental Test & Evaluation	WR	NSWC Phila : Philadelphia, PA	0.000	0.000		0.445	Nov 2016	0.198	Feb 2018	-		0.198	0.000	0.643	-
		Subtotal	17.021	2.080		0.624		0.880		-		0.880	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
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Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	WR	NSWC PHila : Philadelphia, PA	5.552	0.628	Oct 2015	0.317	Nov 2016	0.610	Nov 2017	-		0.610	Continuing	Continuing	Continuing
Travel	Allot	NAVSEA HQ : Washington, DC	0.169	0.007	Sep 2016	0.013	Nov 2016	0.013	Dec 2017	-		0.013	Continuing	Continuing	Continuing
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/CPAF	NAVSEA HQ : Washington, DC	0.000	0.890	Jan 2016	0.757	Jan 2017	0.847	Jan 2018	-		0.847	0.000	2.494	-
Program Management Support	WR	NSWC Caderock : Bethesda, MD	0.000	0.350	Oct 2015	0.276	Nov 2016	0.395	Nov 2017	-		0.395	0.000	1.021	-
		Subtotal	6.073	1.875		1.363		1.865		-		1.865	-	-	-

Remarks

FY 18 includes Financial Management function and increased contractor support for GENISYS.

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	59.467	8.216		5.065		10.080		-		10.080	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0829 / *ENERGY CONSERVATION (ADV)*

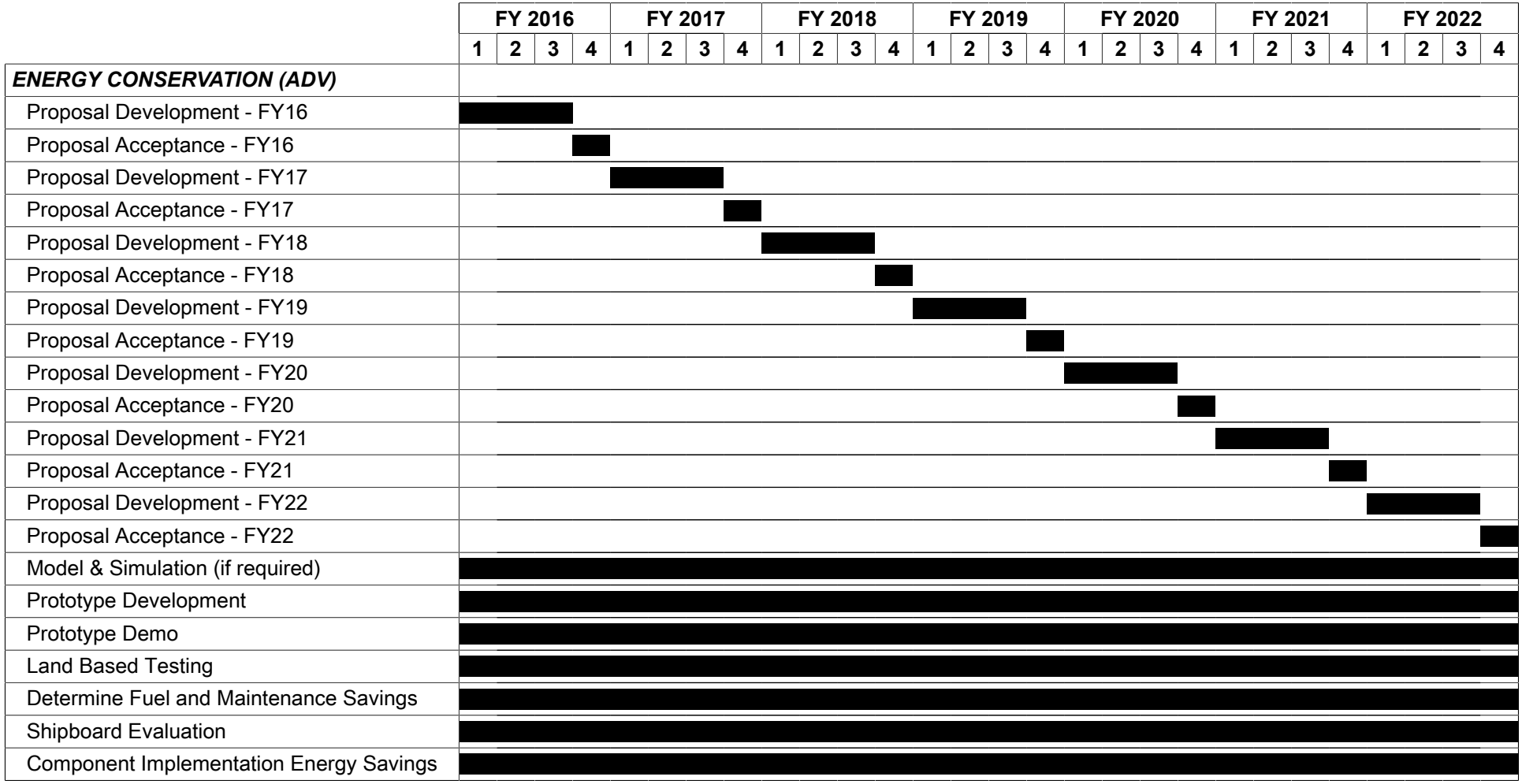

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
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Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
ENERGY CONSERVATION (ADV)				
Proposal Development - FY16	1	2016	3	2016
Proposal Acceptance - FY16	4	2016	4	2016
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
Model & Simulation (if required)	1	2016	4	2022
Prototype Development	1	2016	4	2022
Prototype Demo	1	2016	4	2022
Land Based Testing	1	2016	4	2022
Determine Fuel and Maintenance Savings	1	2016	4	2022
Shipboard Evaluation	1	2016	4	2022
Component Implementation Energy Savings	1	2016	4	2022

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603724N / *Navy Energy Program*	Project (Number/Name) 0838 / *Mobility Fuels (ADV)*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0838: *Mobility Fuels (ADV)*	66.862	12.191	8.100	12.801	-	12.801	12.243	12.400	12.653	12.905	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) ensure interoperability with 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 or commercial grade fuels when military specifications are unavailable or in short supply, (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. 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Naval Tactical Fuels	12.191	8.100	12.801	0.000	12.801
Articles:	-	-	-	-	-
Description: Perform development, test and evaluation work on Naval tactical fuels to: a) determine the extent to which unnecessarily restrictive specification features can be relaxed to reduce cost and increase availability worldwide; b) provide guidance and approval to fleet operators for the safe use of military aircraft that include new additives or are derived from non-petroleum sources; c) make needed periodic changes to the fuel specifications to ensure fuel quality and avoid fleet operating problems while accommodating evolutionary changes in the fuel supply industry and d) improve fleet methods to ensure fuel quality.					
FY 2016 Accomplishments:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Continue to expand the list of qualified renewable sources and production pathways for inclusion into the JP-5 and F-76 specifications. Conduct hardware testing on 100% fully synthetic aviation and shipboard fuels. Continue testing on advanced production pathways. ***FY 2017 Plans:*** Evaluate production pathways that are being proposed for inclusion into commercial aviation fuel specification to determine compatibility with naval aircraft. Conduct research, development, and test and evaluation to mitigate field identified aviation and ship propulsion fuel deficiencies. Initiate testing to support fleet driven request to evaluate hardware impact of single fuel operations. ***FY 2018 Base Plans:*** Expand availability of Naval tactical fuels by qualifying non-petroleum sources/production pathways for inclusion into the JP-5 and JP-8 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. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	12.191	8.100	12.801	0.000	12.801

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.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603724N / *Navy Energy Program*	Project (Number/Name) 0838 / *Mobility Fuels (ADV)*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	WR	NRL : Washington, D.C.	3.457	0.745	Feb 2016	0.850	Nov 2016	0.800	Dec 2017	-		0.800	Continuing	Continuing	Continuing
Systems Engineering	WR	NAWCAD : Patuxent River, MD	12.163	2.255	Nov 2015	2.400	Nov 2016	2.297	Dec 2017	-		2.297	Continuing	Continuing	Continuing
Systems Engineering	WR	NSWC : Philadelphia, PA	3.076	0.432	Jan 2016	0.270	Jan 2017	0.500	Jan 2018	-		0.500	Continuing	Continuing	Continuing
Systems Engineering	WR	NSWC : Bethesda, MD	0.278	0.034	Dec 2015	0.000		0.200	Feb 2018	-		0.200	Continuing	Continuing	Continuing
Systems Engineering	C/FFP	Various : Various	0.000	0.000		0.960	Mar 2017	1.300	Mar 2018	-		1.300	0.000	2.260	2.260
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	19.135	3.466		4.480		5.097		-		5.097	-	-	-

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test Fuel	C/FFP	Various : Various	2.000	0.000		0.000		1.000	May 2018	-		1.000	0.000	3.000	3.000
Test Fuel	C/FFP	Applied Research Associates : Albuquerque, NM	0.000	3.858	Dec 2015	0.000		0.000		-		0.000	0.000	3.858	3.858
Hardware Testing	WR	NAWCAD : Patuxent River, MD	3.149	1.200	Feb 2016	0.100	Nov 2016	1.043	Dec 2017	-		1.043	Continuing	Continuing	Continuing
Hardware Testing	C/CPFF	Life Cycle Engineering : Charleston, SC	7.688	2.342	Feb 2016	2.950	Apr 2017	2.000	Dec 2017	-		2.000	0.000	14.980	14.980
Hardware Testing	SS/CPFF	Rolls Royce : Indianapolis, IN	2.450	0.462	Feb 2016	0.000		0.000		-		0.000	0.000	2.912	2.912
Hardware Testing	C/CPFF	Univ of Dayton Research Inst : Dayton, OH	0.434	0.255	May 2016	0.200	Apr 2017	0.000		-		0.000	0.000	0.889	0.889
Hardware Testing	WR	US Naval Academy : Annapolis, MD	0.098	0.000		0.000		0.050	May 2018	-		0.050	0.000	0.148	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603724N / *Navy Energy Program*	Project (Number/Name) 0838 / *Mobility Fuels (ADV)*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 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	0.000		0.000		3.200	Mar 2018	-		3.200	0.000	4.709	4.709
Hardware Testing	WR	NSWC : Port Hueneme, CA	0.000	0.200	May 2016	0.000		0.000		-		0.000	0.000	0.200	-
Hardware Testing	C/CPFF	DL Mgmt Services JT Venture : Plainfield, IL	0.000	0.004	Mar 2016	0.000		0.000		-		0.000	0.000	0.004	0.004
Fuel Delivery	MIPR	DLA-Energy : Ft. Belvoir, VA	0.195	0.302	Dec 2015	0.150	Dec 2016	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	40.094	8.623		3.400		7.293		-		7.293	-	-	-

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	WR	NAWCAD : Patuxent River, MD	1.003	0.085	Nov 2015	0.203	May 2017	0.393	Dec 2017	-		0.393	Continuing	Continuing	Continuing
Program Management Support	WR	NAVSUP : San Diego, CA	0.017	0.005	Nov 2015	0.005	Nov 2017	0.006	Nov 2017	-		0.006	Continuing	Continuing	Continuing
Program Management Support	C/FFP	Coord Research Council : Alpharetta, GA	0.030	0.010	Dec 2015	0.010	Dec 2017	0.010	Nov 2017	-		0.010	0.000	0.060	0.060
Program Management Support	WR	NAVSEA : Washington, DC	0.000	0.002	Jan 2016	0.002	Apr 2017	0.002	Nov 2017	-		0.002	0.000	0.006	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603724N / *Navy Energy Program*	Project (Number/Name) 0838 / *Mobility Fuels (ADV)*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 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	7.633	0.102		0.220		0.411		-		0.411	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	66.862	12.191		8.100		12.801		-		12.801	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0838 / *Mobility Fuels (ADV)*

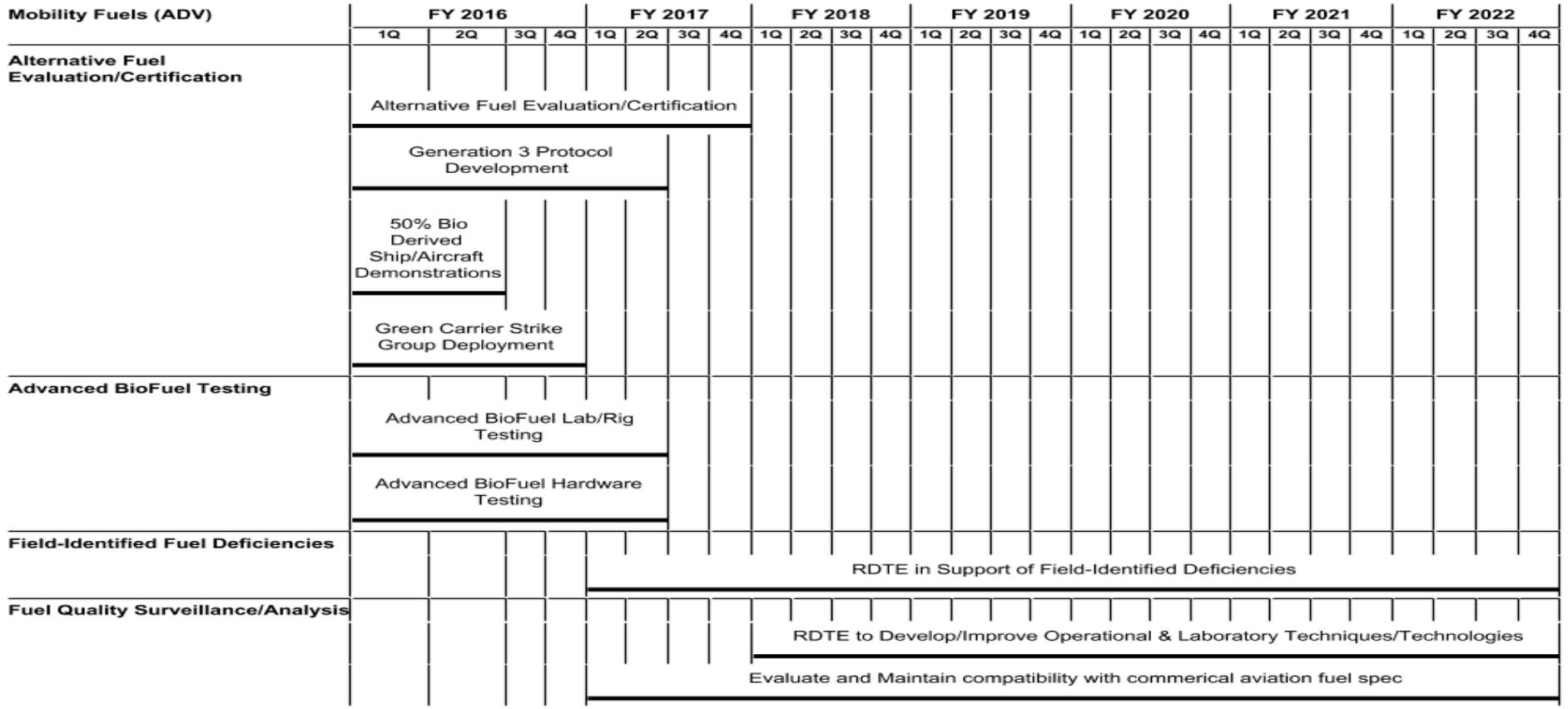

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Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0838 / *Mobility Fuels (ADV)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Mobility Fuels (ADV)				
Alternative Fuel Evaluation/Certification: Alternative Fuel Evaluation/Certification	1	2016	4	2017
Alternative Fuel Evaluation/Certification: Generation 3 Protocol Development	1	2016	2	2017
Alternative Fuel Evaluation/Certification: 50% Bio Derived Ship/Aircraft Demonstrations	1	2016	2	2016
Alternative Fuel Evaluation/Certification: Green Carrier Strike Group Deployment	1	2016	4	2016
Advanced BioFuel Testing: Advanced BioFuel Lab/Rig Testing	1	2016	2	2017
Advanced BioFuel Testing: Advanced BioFuel Hardware Testing	1	2016	2	2017
Field-Identified Fuel Deficiencies: RDTE in Support of Field-Identified Fuel Deficiencies	1	2017	4	2022
Fuel Quality Surveillance/Analysis: RDTE to Develop/Improve Operational & Laboratory Techniques/Technologies	1	2018	4	2022
Fuel Quality Surveillance/Analysis: Evaluate and Maintain compatibility with commerical aviation fuel spec	1	2017	4	2022

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603724N / *Navy Energy Program*	Project (Number/Name) 0928 / *Shore Energy Technology*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0928: *Shore Energy Technology*	48.733	1.519	1.025	2.732	-	2.732	2.884	2.922	2.961	2.951	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 renewable energy use. 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. Currently, the Navy has limited options for producing energy from renewable sources. Private industry and other federal agencies are developing and testing new technologies. Renewable energy from the ocean such as wave, sea water air conditioning, tidal energy, outer continental shelf wind development, ammonia production and utilization, vortex induced vibration marine hydrokinetic, and compressed air storage for ocean energy, among other technologies have potential to alleviate current Navy island installation dependence on fossil fuel, at comparable costs to projected fossil energy sources. Also, advanced energy management systems have potential to increase installation energy security and enable broader use of renewable energy sources.

This Energy RDT&E Project will test, evaluate, and validate components as well as demonstrate cost-effective and technical viability of energy efficiency and renewable energy, energy storage and Alternative Fuel Vehicle prototypes. 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) Renewable Energy to support feasibility evaluation, modeling and possible prototype testing of new energy sources for use at Naval installations with potential for widespread applicability to energy security and renewable energy requirements. Other renewable sources for evaluation, modeling and possible prototype testing may include energy storage (dead-ended fuel cell, zinc air battery, etc.), facility level concentrating solar power, next generation solar heat reflective film, plasma lighting for high wattage applications, micro-inverters for photo-voltaic storage, building level micro-grid, new generation waste heat capture, and other technologies; (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, Sustainable Building Features, Alternative Fuel Vehicles, 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Directed Energy Research	1.519	1.025	2.732	0.000	2.732
Articles:	-	-	-	-	-
FY 2016 Accomplishments: FY16 completed projects initiated in FY14 and FY15. - Completed evaluation of environmental impacts of ocean renewable energy generation systems. - Completed evaluating and testing Wave Energy Systems.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0928 / *Shore Energy Technology*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Completed evaluation for ocean compressed air storage technologies and SWAC optimization. - Initiated demonstration, testing, and evaluation of improved and low cost smart and micro grid energy management technologies. - Demonstration and validation of mature low-cost technologies to be transitioned such as advanced lighting, sustainable building technologies, solar PV collection technologies, alternative fuel vehicles, and improved energy storage systems at Naval installations. The FY16 plan included: - Completed demonstration, testing, deployment, and evaluation of smart energy and micro-grid management technology; and begin development of technical specifications. - Completed demonstration and validation of mature technologies to be transitioned such as sustainable building technologies, alternative fuel vehicles, and improved energy storage systems and integration at Naval installations. - The FY16 plan has reduced the number of new technologies evaluated for alternative energy, grid management, efficiency and sustainable building technologies. In addition, the validation will delay development of procurement specifications impacting deployment of these technologies beyond 2020.					
FY 2017 Plans: FY17 will focus on completing or continuing projects initiated in FY15 and FY16. - Continue evaluating and testing Wave Energy Systems to include power generation, to grid integration and monitoring of environmental effects of these systems. - Continue demonstration, testing, and evaluation of improved and low cost smart and micro grid energy management technologies. -Initiate demonstration and validation of new energy storage, energy efficiency, and renewables technologies. -Defer demonstration of new alternative vehicle technologies and CYBER secure technologies to FY18. OCO: N/A.					
FY 2018 Base Plans: FY18 will focus on completing or continuing projects initiated in FY16 and FY17. - Continue demonstration, testing, and evaluation of improved and low cost smart and micro grid energy management technologies. - Continue demonstration and validation of new energy storage, energy efficiency, and renewable technologies.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0928 / *Shore Energy Technology*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Initiate demonstration of cyber secure technologies utilizing cyber testbed. - Continue to support Energy Program effort for Smart Grid Analytics, Shore Energy Research, Energy Restoration and Modernization. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	1.519	1.025	2.732	0.000	2.732

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 to achieve 25% Renewable Energy Increase by 2025.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319 / 4					R-1 Program Element (Number/Name) PE 0603724N / *Navy Energy Program*				Project (Number/Name) 0996 / *Aircraft Energy Conservation*			
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
0996: *Aircraft Energy Conservation*	95.823	20.916	13.289	25.010	-	25.010	24.977	25.138	25.464	25.972	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.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Aircraft Energy Conservation	20.916	13.289	25.010	0.000	25.010
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Conduct F135 fuel burn reduction engine demonstration. Continue identification, validation, and implementation of energy conservation/efficiency concepts into the fleet. Conduct validation of energy efficiency aircraft subsystem technologies and advanced planning and mission/navigation technologies.					
FY 2017 Plans: Complete analysis of F135 fuel burn reduction engine demonstration. Conduct flight testing of F-18 trim optimization algorithms. Continue identification, validation, and implementation of fleet best practices and metrics. Evaluate advanced engine efficiency technologies for F-18, MQ-8C and H-53.					
FY 2018 Base Plans: Continue identification, validation, and implementation of energy conservation/efficiency concepts. Conduct evaluation, development, and validation of energy efficiency aircraft subsystem technologies. Core efforts such as identification, development and validation of fleet best practices and validation of an advanced algorithm to optimize the trim/ reduce the drag of the F-18 during flight will continue. Projects still in consideration for FY17 down select and continuance into FY-18 include advance fuel efficient engine technologies for multiple platforms, advanced mission planning technologies, utilization of the trim optimization algorithm in other platforms and the use of a recuperative technology to improve the engine efficiency of the MQ-8C.					
FY 2018 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0996 / *Aircraft Energy Conservation*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A					
Accomplishments/Planned Programs Subtotals	20.916	13.289	25.010	0.000	25.010

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

This is a non-acquisition program that develops, evaluates, and validates mature technologies in support of fleet fuel and 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: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603724N / *Navy Energy Program*	Project (Number/Name) 0996 / *Aircraft Energy Conservation*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	WR	NAWCAD : Patuxent River, MD	3.849	0.841	Dec 2015	0.955	Nov 2016	1.590	Nov 2017	-		1.590	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		1.200	Jan 2018	-		1.200	0.000	1.600	1.600
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	0.000		1.150	Jan 2017	0.000		-		0.000	0.000	1.150	1.150
Systems Engineering	C/CPFF	Various : Various	0.000	0.000		3.669	Jan 2017	12.645	Mar 2018	-		12.645	0.000	16.314	16.314
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/FFP	General Electric : Lynn, MA	0.000	0.000		0.000		1.500	Dec 2017	-		1.500	0.000	1.500	1.500
Systems Engineering	C/BA	Deloitte Consulting : Alexandria, VA	0.000	0.000		0.700	Jul 2017	0.900	Jan 2018	-		0.900	0.000	1.600	1.600
		Subtotal	7.461	0.841		6.474		17.835		-		17.835	-	-	-

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Hardware Testing	C/CPFF	PWA : Hartford, CT	78.598	17.113	Nov 2015	4.140	Oct 2016	0.000		-		0.000	0.000	99.851	99.851
Hardware Testing	WR	NAWCAD : Patuxent River, MD	1.807	0.378	Dec 2015	2.400	Nov 2016	0.733	Nov 2017	-		0.733	Continuing	Continuing	Continuing
Hardware Testing	C/CPFF	Lockheed : Fort Worth, TX	3.134	0.000		0.000		0.000		-		0.000	0.000	3.134	3.134
Prior year T&E no longer funded in the FYDP	Various	Various : Various	0.100	0.000		0.000		6.000	Feb 2018	-		6.000	0.000	6.100	-
Test and Evaluation	C/CPFF	The Boeing Company : Seattle, WA	0.000	1.500	Aug 2016	0.000		0.000		-		0.000	0.000	1.500	1.500

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603724N / *Navy Energy Program*	Project (Number/Name) 0996 / *Aircraft Energy Conservation*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	83.639	18.991		6.540		6.733		-		6.733	-	-	-

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	WR	NAWCAD : Patuxent River, MD	1.095	0.200	Nov 2015	0.275	Nov 2016	0.442	Nov 2017	-		0.442	Continuing	Continuing	Continuing
Program Management Support	C/FFP	Deloitte Consulting : Alexandria, VA	1.531	0.884	Nov 2015	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	4.723	1.084		0.275		0.442		-		0.442	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	95.823	20.916		13.289		25.010		-		25.010	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0996 / *Aircraft Energy Conservation*

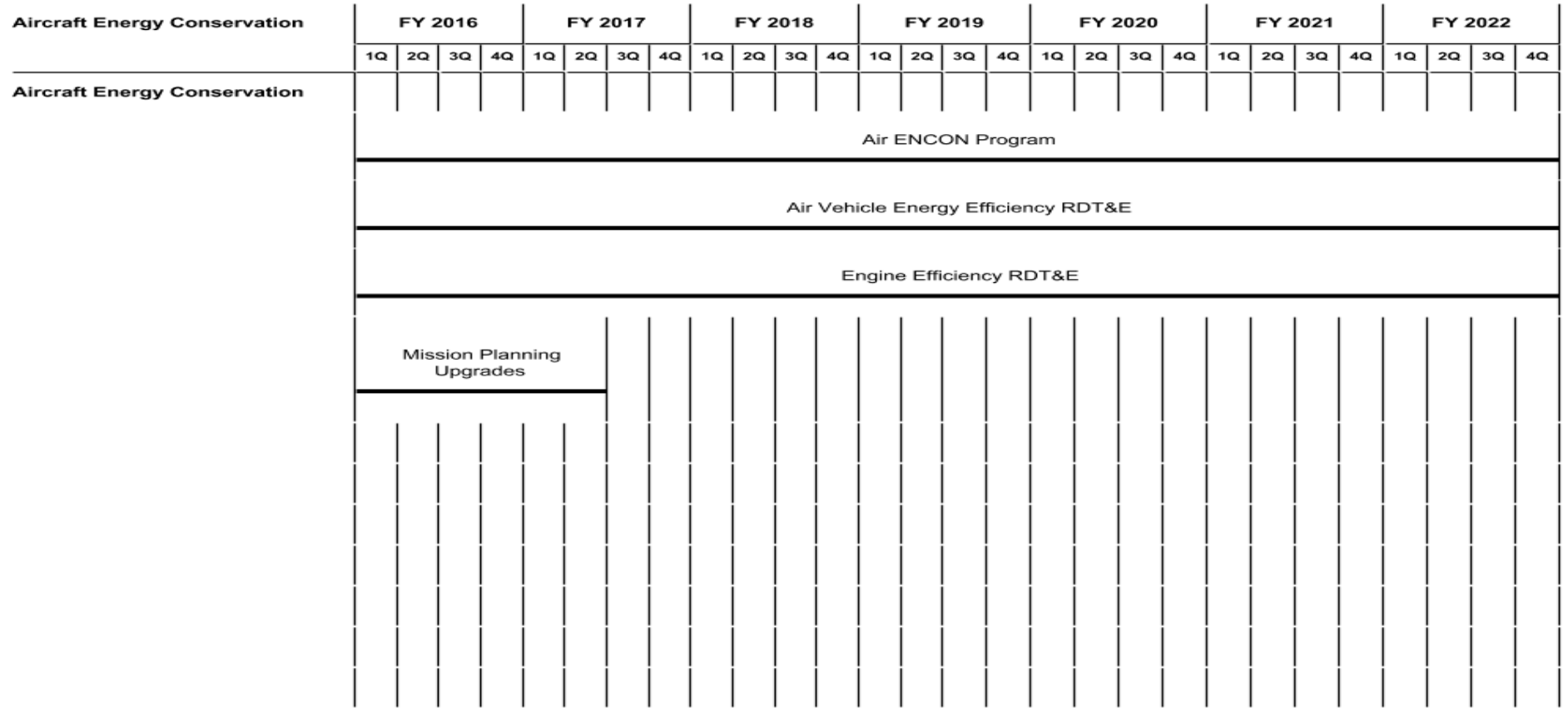

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Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0996 / *Aircraft Energy Conservation*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Aircraft Energy Conservation				
Aircraft Energy Conservation: Air ENCON Program	1	2016	4	2022
Aircraft Energy Conservation: Air Vehicle Energy Efficiency RDT&E	1	2016	4	2022
Aircraft Energy Conservation: Engine Efficiency RDT&E	1	2016	4	2022
Aircraft Energy Conservation: Mission Planning Upgrades	1	2016	2	2017

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603724N / *Navy Energy Program*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
9999: *Congressional Adds*	0.000	12.069	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	12.069
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 2016	FY 2017
Congressional Add: Navy Energy Increase	12.069	0.000
FY 2016 Accomplishments: N/A		
FY 2017 Plans: N/A		
Congressional Adds Subtotals	12.069	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

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy												Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603725N *I Facilities Improvement*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	9.470	3.726	5.458	2.837	-	2.837	4.024	3.970	3.800	3.814	Continuing	Continuing
0995: *Naval Facilities System*	6.615	1.154	2.066	1.786	-	1.786	2.252	2.254	2.221	2.228	Continuing	Continuing
3155: *Force Protection Ashore*	2.369	0.575	1.230	1.051	-	1.051	1.772	1.716	1.579	1.586	Continuing	Continuing
3347: *Navy Expeditionary Energy Development*	0.486	1.997	2.162	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.645

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. This project is consistent with recommendations of two National Academy of Sciences Reports: "The Role of Federal Agencies in Fostering New Technology and Innovation in Building" and "Federal Policies to Foster Innovation and Improvement in Constructed Facilities."

Started in FY 2006 the 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: FY 2018 Navy					Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*			R-1 Program Element (Number/Name) PE 0603725N *I Facilities Improvement*		
B. Program Change Summary ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**
Previous President's Budget	3.726	5.458	3.772	-	3.772
Current President's Budget	3.726	5.458	2.837	-	2.837
Total Adjustments	0.000	0.000	-0.935	-	-0.935
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Program Adjustments	0.000	0.000	-0.607	-	-0.607
• Rate/Misc Adjustments	0.000	0.000	-0.328	-	-0.328

Change Summary Explanation

The FY 2018 funding request was also reduced by $0.607 million to account for the availability of prior year execution balances.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319 / 4					R-1 Program Element (Number/Name) PE 0603725N / *Facilities Improvement*				Project (Number/Name) 0995 / *Naval Facilities System*			
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
0995: *Naval Facilities System*	6.615	1.154	2.066	1.786	-	1.786	2.252	2.254	2.221	2.228	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). 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):
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

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603725N / *Facilities Improvement*	**Project (Number/Name)** 0995 / *Naval Facilities System*

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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Waterfront facilities, repair, upgrade and service life extension:	0.300	0.807	0.707	0.000	0.707
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Completed waterfront seismic analysis and standard seismic risk mitigation procedures for a CVN/Ship in dry-dock. Continue to identify and validate operational and maintenance issues of waterfront facilities associated with supporting the Navy's new class of ships and submarines, including the Ohio Class Replacement Submarine. Continued with performance enhancement of small floating piers. Completed tsunami load and effects on critical navy waterfront structures. Initiated Sea Level Rise effects on Navy waterfront structures.					
FY 2017 Plans: Complete Ultra High Performance Concrete for Structural Repairs and Modular Construction: Identify where to use ultra-high performance concrete (UHPC) for repairs. Test and evaluate repair methods for cost and durability. Findings will transition into unified criteria. Continue Floating Pier Eval hydrodynamics: Conduct failure analysis and develop retrofit methods for floating piers. Conduct field tests of retrofit methods to confirm analysis. Findings will transition into unified criteria. Continue Engineered Cementitious Composite (ECC) for Reinforced Concrete Repairs: Test and evaluate the use of ECC in highly corrosive environments as a repair material for reinforced concrete structures. Findings will transition into unified criteria. Continue Structural numerical joint Analytics: Build numerical models of structural joints subject to wave and tidal motions such as those found in dry docks, piers and wharves. Use models to improve joint design through dynamic analysis and model refinement. Findings will transition into unified criteria. Initiate Sea Level Rise effects on Navy waterfront structures: Use existing forecasts of sea level rise as a basis for modelling wave, tidal and storm surge effects on structures. Model mitigation measures and analyze cost-benefit to identify most effective retrofit methods and systems.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603725N / *Facilities Improvement*	**Project (Number/Name)** 0995 / *Naval Facilities System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Initiate autonomous inspection technologies and systems for waterfront facilities: Define requirements for autonomous inspection technology including use below the waterline. Identify autonomous technologies and systems to test against requirements. Test and evaluate technologies. Findings will transition into unified criteria.					
FY 2018 Base Plans: FY18 Plans to include: -Initiate High Altitude Electro Magnetic Pulse (HEMP) hardening project for Navy Ocean Cable Shore Facilities: This project will develop defensive measures, referred to as hardening, against the potential use of HEMP above Waterfront Facilities Systems An electromagnetic pulse (EMP) is a burst of electromagnetic radiation created by a specially designed and deployed explosion. When that explosion is set off at a high altitude, it is referred to as a HEMP. As an offensive weapon, a HEMP is deployed to render inoperable all electronic equipment subject to its burst of electromagnetic radiation. [$92K] -Initiate investigation into Fluid Induced Vibrational (FIV) Degradation and Augmented Reality (AR) systems. [$20K] -Continue Floating Pier Evaluation hydrodynamics: Conduct failure analysis and develop retrofit methods for floating piers. Conduct field tests of retrofit methods to confirm analysis. Findings will transition into Unified Facilities Criteria (UFC) Project, in accordance with the DoD Instruction 4120.24. [$162K] -Continue Engineered Cementitious Composite (ECC) for Reinforced Concrete Repairs: Test and evaluate the use of ECC in highly corrosive environments as a repair material for reinforced concrete structures. Findings will transition into Unified Facilities Criteria (UFC) Project, in accordance with the DoD Instruction 4120.24. [$109K] -Continue Structural numerical joint Analytics: 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 to improve joint design through dynamic analysis and model refinement. Findings will transition into Unified Facilities Criteria (UFC) Project, in accordance with the DoD Instruction 4120.24. [$162K] -Continue Sea Level Rise effects on Navy waterfront structures: Use existing forecasts of sea level rise as a basis model wave, tidal and storm surge effects on structures. Model mitigation measures and analyze cost-					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603725N / *Facilities Improvement*	**Project (Number/Name)** 0995 / *Naval Facilities System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
benefits to identify most effective retrofit methods and systems, vice replacing the entire waterfront system. [$162K] ***FY 2018 OCO Plans:*** N/A					
Title: Sustainment, Restoration & Modernization:	0.854	1.259	1.079	0.000	1.079
Articles:	-	-	-	-	-
FY 2016 Accomplishments: The projects continued from FY15 are: Completed Corrosion Prevention & Control projects, emphasized sustainable design and improved lifecycle cost reductions. Completed high temperature pavement design mix optimization to improve cost, performance, and integration with other new aviation platforms. Completed seismic analysis of Earth Covered Magazines (ECM). Completed verifying the effectiveness of vapor phase corrosion inhibitors in protection of aboveground storage tanks.					
FY 2017 Plans: Complete Viscous Elastic Coatings: Evaluate cost effectiveness and durability of coatings to protect fuel and utility pipelines against corrosion. Findings will transition into unified criteria. Complete Durable Concrete Repairs: Evaluate cost effectiveness and durability of coatings to protect reinforced concrete against corrosion. Findings will transition into unified criteria. Complete Verifying the Effectiveness of Vapor Phase Corrosion Inhibitors (VpCI) in Protection of Aboveground Storage Tanks: Evaluate VpCI probes and conduct validation testing. Findings will transition into unified criteria. Complete Water Storage Tank Galvanic Anode Cathodic Protection Controller: Evaluate galvanic anode cathodic protection (GPC) systems at selected installations for cost, installation, performance and durability. Analyze results and recommend performance specifications for GPC systems. Findings will transition into unified criteria. Initiate analysis of Additive Manufacturing (AM) capabilities for facilities and infrastructure for both new and existing assets: Investigate existing and projected applications of AM to facilities and infrastructure. Define					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603725N / *Facilities Improvement*	**Project (Number/Name)** 0995 / *Naval Facilities System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
requirements for AM technology applications. Procure and evaluate AM technology against requirements in developmental and operational tests. Findings will transition into unified criteria. ***FY 2018 Base Plans:*** FY18 Plans to include: -Initiate Unmanned Systems for the Facilities Inspection and Design Reconstruction. 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. [$307K] -SPIDERS 3D Asset Component Date project for development of Augmented Reality (AR) facilities and Geographic Information System (GIS). The SPIDERS 3D visualization design process allows collaboration among Fleet, and Shore and Facility stakeholders in separate locations to more easily participate in the planning evolutions of new ships and aircraft. The SPIDERS 3D reviews reflect the latest platform design concept manipulated "live" for all collaborators in scenes consisting of both real and notional shore support facilities and infrastructure. [$367K] -Continue analysis of Additive Manufacturing (AM) capabilities for facilities and infrastructure for both new and existing assets: Investigate existing and projected applications of AM to facilities and infrastructure. Define requirements for AM technology applications. Procure and evaluate AM technology against requirements in developmental and operational tests. Findings will transition into unified facilities criteria. [$405K] ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	1.154	2.066	1.786	0.000	1.786

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

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603725N / *Facilities Improvement*	**Project (Number/Name)** 0995 / *Naval Facilities System*

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-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603725N / *Facilities Improvement*	Project (Number/Name) 3155 / *Force Protection Ashore*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3155: *Force Protection Ashore*	2.369	0.575	1.230	1.051	-	1.051	1.772	1.716	1.579	1.586	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. 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Force Protection Ashore	0.575	1.230	1.051	0.000	1.051
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Funds supported: - Completed ship-to-shore common information exchange project, focusing on integration of a prototype system with a representative EHSS installation and testing in a controlled test environment. - [$163K] - Developmental Test & Evaluation (DT); NSWC - Panama City - Completed versatile access control project to integrate and test an enhanced access control approach, leveraging multiple credential types, biometrics and enhancing the detection of vehicles and personnel in and around an Access Control Point. - [$225K] - Developmental Test & Evaluation (DT); NSWC-Dahlgren - Completed Waterside Protection - Boat Barrier Electronic Infrastructure project to assess EHSS performance, environmental, and operational impact and added benefits of next generation boat barriers. - [$150K] - Operational Test & Evaluation (OT); SSC-PAC					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603725N / *Facilities Improvement*	**Project (Number/Name)** 3155 / *Force Protection Ashore*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Completed the integration and demonstration of Automated Sensor Assessment and Course of Action Plan (COAP) with EHSS and document baselines specifications. [$37k]- Spiral Development; SSC: PAC					
FY 2017 Plans: Funds will support continued and initiated projects from FY15 and FY 16 as follows: -Complete Waterside Protection - Boat Barriers project to access performance, environmental, and operational impact and added benefits of next generation boat barriers. -[$267K] - Operational Test & Evaluation (OT); CTTSO -Initiate Installation Protection Capability Development - Airborne Threat project to detect, assess and clasisify for the defense against full-scale and man-deployable airborne threats (e.g., UAV, drones, remote-control [R/C] platforms. - [$538K] - Developmental Test & Evaluation (DT); SSC-PAC -Initiate 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 (preventive maintenance). - [$425K] - Developmental Test & Evaluation (DT); NSWC Dahlgren					
FY 2018 Base Plans: FY 2018 Base Plans: Funds will support continued and initiated projects from FY16 and FY17 as follow: - 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. - [$375K] - Developmental Test & Evaluation (DT); NAWCAD - 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). - [$271K] - Developmental Test & Evaluation (DT); NSWC Dahlgren - Continue Waterside Protection - Boat Barriers project to access performance, environmental, and operational impact and added benefits of next generation boat barriers using bidirectional technology. - [$405K] - Developmental Test & Evaluation (OT); CTTSO					
FY 2018 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603725N / *Facilities Improvement*	**Project (Number/Name)** 3155 / *Force Protection Ashore*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A					
Accomplishments/Planned Programs Subtotals	0.575	1.230	1.051	0.000	1.051

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-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603725N / *Facilities Improvement*	Project (Number/Name) 3347 / *Navy Expeditionary Energy Development*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3347: *Navy Expeditionary Energy Development*	0.486	1.997	2.162	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.645
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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Expeditionary Environmental Control Unit (EECU)	1.997	2.162	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2016 Accomplishments: - Develop, design, and fabricate full scale prototypes (TRL 7) for technical and operational testing. One prototype is for an ECU utilizing the exhaust heat from generators which is currently wasted. Second prototype is for a new ECU based on Sterling cycle technology which is projected to reduce energy consumption by 30%.					
FY 2017 Plans: Perform technical and operational testing on the prototypes. Prototypes represent technology which will (1) utilize exhaust heat and (2) utilize the Sterling cycle technology.					
FY 2018 Base Plans: N/A					
FY 2018 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	1.997	2.162	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603725N / *Facilities Improvement*	**Project (Number/Name)** 3347 / *Navy Expeditionary Energy Development*

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.

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

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603734N *I (U)CHALK CORAL*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	0.000	168.960	245.860	245.143	-	245.143	290.722	306.555	315.612	323.797	Continuing	Continuing
1804: *Chalk Coral*	0.000	168.960	245.860	245.143	-	245.143	290.722	306.555	315.612	323.797	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	174.771	245.860	223.929	-	223.929
Current President's Budget	168.960	245.860	245.143	-	245.143
Total Adjustments	-5.811	0.000	21.214	-	21.214
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.800	0.000			
• SBIR/STTR Transfer	-5.011	0.000			
• Program Adjustments	0.000	0.000	22.863	-	22.863
• Rate/Misc Adjustments	0.000	0.000	-1.649	-	-1.649

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603739N *I Navy Logistic Productivity*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	42.313	3.728	3.089	2.995	-	2.995	3.357	3.300	3.225	3.289	Continuing	Continuing
2955: *JEDMICS*	40.614	2.840	2.191	2.391	-	2.391	2.172	2.165	2.210	2.254	Continuing	Continuing
3223: *Logistics R&D*	1.699	0.888	0.898	0.604	-	0.604	1.185	1.135	1.015	1.035	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	3.866	3.089	3.243	-	3.243
Current President's Budget	3.728	3.089	2.995	-	2.995
Total Adjustments	-0.138	0.000	-0.248	-	-0.248
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.138	0.000			
• Program Adjustments	0.000	0.000	-0.219	-	-0.219
• Rate/Misc Adjustments	0.000	0.000	-0.029	-	-0.029

Change Summary Explanation

Technical: Not applicable.

Schedule: Not applicable.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603739N / *Navy Logistic Productivity*	Project (Number/Name) 2955 / *JEDMICS*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2955: *JEDMICS*	40.614	2.840	2.191	2.391	-	2.391	2.172	2.165	2.210	2.254	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: JEDMICS Development	2.788	2.141	2.339	0.000	2.339
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. 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 2016 Accomplishments:*** Develop and integrate JEDMICS Software Release 3.0.17. ***FY 2017 Plans:***					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603739N / *Navy Logistic Productivity*	**Project (Number/Name)** 2955 / *JEDMICS*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Develop and integrate JEDMICS Software Release 3.0.18. ***FY 2018 Base Plans:*** Develop and integrate JEDMICS Software Release 3.0.19. ***FY 2018 OCO Plans:*** N/A					
Title: JEDMICS Test	0.027	0.026	0.026	0.000	0.026
Articles:	-	-	-	-	-
Description: Conduct test and readiness reviews and functional performance tests on JEDMICS system. ***FY 2016 Accomplishments:*** Complete DT of JEDMICS Software Release 3.0.16. Initiate DT of JEDMICS Software Release 3.0.17. ***FY 2017 Plans:*** Complete DT of JEDMICS Software Release 3.0.17. Initiate DT of JEDMICS Software Release 3.0.18. ***FY 2018 Base Plans:*** Complete DT of JEDMICS Software Release 3.0.18. Initiate DT of JEDMICS Software Release 3.0.19. ***FY 2018 OCO Plans:*** N/A					
Title: JEDMICS Evaluation & Review	0.025	0.024	0.026	0.000	0.026
Articles:	-	-	-	-	-
Description: Conduct technical evaluations and configuration control reviews of JEDMICS system. ***FY 2016 Accomplishments:*** Conduct technical evaluations and reviews for JEDMICS Software Release 3.0.18. ***FY 2017 Plans:*** Conduct technical evaluations and reviews for JEDMICS Software Release 3.0.19. ***FY 2018 Base Plans:*** Conduct technical evaluations and reviews for JEDMICS Software Release 3.0.20. ***FY 2018 OCO Plans:***					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603739N / *Navy Logistic Productivity*	**Project (Number/Name)** 2955 / *JEDMICS*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A					
Accomplishments/Planned Programs Subtotals	2.840	2.191	2.391	0.000	2.391

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-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603739N / *Navy Logistic Productivity*	Project (Number/Name) 3223 / *Logistics R&D*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3223: *Logistics R&D*	1.699	0.888	0.898	0.604	-	0.604	1.185	1.135	1.015	1.035	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.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Quality of Life Services Modernization & Cost Reduction	0.000	0.000	0.297	0.000	0.297
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					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603739N / *Navy Logistic Productivity*	**Project (Number/Name)** 3223 / *Logistics R&D*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
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. Additional automated food service management modules with touch screen technology to use for menu development, assign work tasks, recipe conversion, temperature and times logs for food service documentation preparation. These platforms will be capable of providing step-by-step, two and three dimensional animation, interactive training in these areas: food service sanitation procedures, food science, food service administration, galley operations and safety, and equipment operations. ***FY 2016 Accomplishments:*** N/A ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** 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. ***FY 2018 OCO Plans:*** N/A					
Title: Readiness through Logistics Solutions ***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). ***FY 2016 Accomplishments:*** N/A ***FY 2017 Plans:*** Navy's non-self deploying combat forces use the 20+ year old U.S. Army system, Transportation Coordinators Automated Information for Movement System (TC-AIMS II), to document and initiate logistics shipments. TC-	0.000 -	0.600 -	0.127 -	0.000 -	0.127 -

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603739N / *Navy Logistic Productivity*	**Project (Number/Name)** 3223 / *Logistics R&D*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
AIMS is rapidly approaching technological obsolescence. A joint (Navy, Marine Corps, and Coast Guard) effort was pursued and a Business Case Analysis software requirements and Independent Government Cost Estimate identified USTRANSCOM's ICODES system (Integrated Computerized Deployment System) as the most logical exiting system to insert and develop with the Sea Service Deployment Module (SSDM) functionality. SSDM will consolidate and improve visibility of naval mobility shipments worldwide. The Navy will then be compliant with DoD's mandate for transportation systems to include Transportation Tracking Number (TTN), which is not resident in TC-AIMS II. The TTN is a Joint Staff requirement directly tied to OPSEC, OPLANS, and In-Transit Visibility. ***FY 2018 Base Plans:*** Finalize Sea Service Deployment Module (SSDM) functionality. ***FY 2018 OCO Plans:*** N/A					
Title: Logistics Data Access and Information Sharing ***Articles:*** ***Description:*** Numerous electronic information technology (IT) systems exist that contain logistics data and information. Very often that data/information can be difficult to: 1) access by individual users, 2) share between other IT systems, and 3) secure from cyber threats that continue to grow and rapidly proliferate. The lack of access, sharing, and security results in inefficient processes, manual work-arounds, and increased security risk, which impedes performance and increases cost. NAVSUP must ensure accelerated supply systems decision making via seamless secure access to information through user friendly administrative, financial, and logistics web-based capabilities. ***FY 2016 Accomplishments:*** Capability to facilitate improved access; use of logistics data by both individual users and between IT systems; cyber security communications capabilities in the information environment. Capability includes, but is not limited to, enhanced Graphical User Interfaces (GUI) and web-based data services and other community-based software tools and technologies that can enable broader exposure and sharing of logistics data based on customer requirements for data representation, metadata, format and delivery. Capability consists of decision-making and full spectrum cyber operations, such as, system architecture, tactical cloud, integration and data interoperability. ***FY 2017 Plans:***	0.199 -	0.000 -	0.000 -	0.000 -	0.000 -

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603739N / *Navy Logistic Productivity*	**Project (Number/Name)** 3223 / *Logistics R&D*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A					
Title: Supply Chain Optimization/Breakthrough Technologies to Improve Supply Chain Processing	0.250	0.000	0.180	0.000	0.180
Articles:	-	-	-	-	-
Description: As a result of the continuous change within the naval logistics community, a broad spectrum of innovations in business processes, tools, infrastructure, and technology are required for maintaining and improving operational performance, efficiency, and effectiveness. This gap is expressly broad in order to allow any of the five capability gaps listed below to meet criteria for funding as determined by LogIC. ***FY 2016 Accomplishments:*** Efforts of interest will continue to focus on assessing opportunities for use of Additive Manufacturing (AM) technology in order to fulfillment through timely insertions of AM technology into naval platforms and installations. AM enables the increase of supply availability and reduces inventory cost to the Navy Supply System. Applied Research Laboratories will be integrating Information Technology (IT) strategies for delivering AM capability within the supply chain to include Logistics IT systems in Navy Enterprise Resource Planning (ERP) and data associated strategies. They identify key points of cyber security vulnerability and potential mitigation strategies that occur with AM. ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** Efforts will continue to focus on assessing opportunities for use of AM technology in order fulfillment through timely insertion of AM technology into naval platforms and installations. ***FY 2018 OCO Plans:*** N/A					
Title: Clothing Protection for the Warfighter	0.439	0.298	0.000	0.000	0.000
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603739N / *Navy Logistic Productivity*	**Project (Number/Name)** 3223 / *Logistics R&D*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
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). ***FY 2016 Accomplishments:*** A capability to assess commercial off- the-shelf (COTS) items, identify/develop laboratory test methods to determine applicability of COTS items and address quality assurance measures to allow upgrades to uniform/ protective clothing capabilities in a cost effective manner. Enhanced capabilities are required in the areas of thermal/flame threats, protective footwear as well as environmental and physical protection. Enhanced capabilities are required that provide improved color retention, improved comfort, improved coolness and improved anti-wrinkle qualities. A capability to correlate current material technologies and manufacturing processes with potential advanced techniques is required to mitigate costly/antiquated uniforms and manufacturing costs, work uniform category specifically. A capability to jointly incorporate current anthropometric data (USA, USMC and USN) into the fit and sizing of common work/combat uniforms; focus would be to standardize patterns and size tariffs, resulting in a streamlined uniform issue process which would allow the warfighter to purchase off the rack uniforms without costly alterations and enhance uniform size forecasting; resulting in having the "needed" sizes in stock. ***FY 2017 Plans:*** 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. ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.888	0.898	0.604	0.000	0.604

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603739N / *Navy Logistic Productivity*	**Project (Number/Name)** 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-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603746N *I (U)RETRACT MAPLE*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	0.000	340.897	323.526	306.101	-	306.101	153.613	120.629	111.772	103.896	Continuing	Continuing
1906: *Retract Maple*	0.000	340.897	323.526	306.101	-	306.101	153.613	120.629	111.772	103.896	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	359.856	323.526	223.727	-	223.727
Current President's Budget	340.897	323.526	306.101	-	306.101
Total Adjustments	-18.959	0.000	82.374	-	82.374
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-8.900	0.000			
• SBIR/STTR Transfer	-10.059	0.000			
• Program Adjustments	0.000	0.000	16.860	-	16.860
• Rate/Misc Adjustments	0.000	0.000	65.514	-	65.514

Change Summary Explanation

Technical: Not applicable.

Schedule: Not applicable.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603748N *I (U)LINK PLUMERIA*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	0.000	192.336	318.497	253.675	-	253.675	334.760	332.551	177.076	197.934	Continuing	Continuing
1978: *Link Plumeria*	0.000	192.336	318.497	253.675	-	253.675	334.760	332.551	177.076	197.934	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	237.376	318.497	306.728	-	306.728
Current President's Budget	192.336	318.497	253.675	-	253.675
Total Adjustments	-45.040	0.000	-53.053	-	-53.053
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-37.000	0.000			
• SBIR/STTR Transfer	-8.040	0.000			
• Program Adjustments	0.000	0.000	-29.601	-	-29.601
• Rate/Misc Adjustments	0.000	0.000	-23.452	-	-23.452

Change Summary Explanation

Technical: Not applicable.

Schedule: Not applicable.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603751N *I (U)RETRACT ELM*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	0.000	36.086	52.834	55.691	-	55.691	56.630	55.107	47.614	45.390	Continuing	Continuing
2003: *Retract Elm*	0.000	36.086	52.834	55.691	-	55.691	56.630	55.107	47.614	45.390	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	37.700	52.834	48.930	-	48.930
Current President's Budget	36.086	52.834	55.691	-	55.691
Total Adjustments	-1.614	0.000	6.761	-	6.761
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.440	0.000			
• SBIR/STTR Transfer	-1.174	0.000			
• Program Adjustments	0.000	0.000	6.238	-	6.238
• Rate/Misc Adjustments	0.000	0.000	0.523	-	0.523

Change Summary Explanation

Technical: Not applicable.

Schedule: Not applicable.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603764N *I (U)LINK EVERGREEN*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	0.000	45.603	48.116	48.982	-	48.982	0.000	0.000	0.000	0.000	0.000	142.701
1972: *Link Evergreen*	0.000	45.603	48.116	48.982	-	48.982	0.000	0.000	0.000	0.000	0.000	142.701

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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	47.312	48.116	48.982	-	48.982
Current President's Budget	45.603	48.116	48.982	-	48.982
Total Adjustments	-1.709	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.709	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: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603787N *I (U)SPECIAL PROCESSES*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	0.000	16.769	13.619	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	30.388
0116: *Linear Tank*	0.000	16.769	13.619	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	30.388

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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	17.392	13.619	12.360	-	12.360
Current President's Budget	16.769	13.619	0.000	-	0.000
Total Adjustments	-0.623	0.000	-12.360	-	-12.360
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.623	0.000			
• Program Adjustments	0.000	0.000	-12.360	-	-12.360
• 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: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603790N *I NATO Research and Deve*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	64.267	8.320	9.867	9.099	-	9.099	10.772	10.722	10.522	10.476	Continuing	Continuing
2293: *NATO Cooperative R & D*	64.267	8.320	9.867	9.099	-	9.099	10.772	10.722	10.522	10.476	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	8.320	9.867	10.548	-	10.548
Current President's Budget	8.320	9.867	9.099	-	9.099
Total Adjustments	0.000	0.000	-1.449	-	-1.449
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Program Adjustments	0.000	0.000	-1.449	-	-1.449

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603790N / *NATO Research and Deve*	Project (Number/Name) 2293 / *NATO Cooperative R & D*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2293: *NATO Cooperative R & D*	64.267	8.320	9.867	9.099	-	9.099	10.772	10.722	10.522	10.476	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

In accordance with Title 10 U.S. Code Section 2350a, this project provides funding for research and development projects with approved allies under international agreements. These funds can only be applied to work efforts in the U.S.. The Office of Secretary of Defense 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 SSOI which also states why the project serves to increase the conventional 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.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: NATO Cooperative R & D	8.320	9.867	9.099	0.000	9.099
Articles:	-	-	-	-	-
FY 2016 Accomplishments: -Continue to support approved Cooperative projects from FY2014/FY2015. -Plan and support approved FY2016 Cooperative projects. Projects include: -Advance Material Propeller U.S. and Australia -Expeditionary Modeling & Simulation Project Arrangement (AUSEMS) U.S. and Australia -Dynamic System Mechanics Advanced Simulation-Shallow Confined Waters (DYSMAS-SCW) U.S. and Germany -Hull Treatments U.S. and United Kingdom (UK) -Large Displacement Unmanned Undersea Vehicles (LD UUV) U.S. and Korea -Submarine Hydrodynamics U.S. and Australia -Allied Munitions Detection-Underwater Initiative (ALMOND-U) U.S. and Germany -Undersea Optical Communications (OCOMMS) U.S. and United Kingdom					
FY 2017 Plans: -Continue to support approved Cooperative projects from FY2015/FY2016. -Plan and support approved FY2017 Cooperative projects. Projects include:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603790N / *NATO Research and Deve*	**Project (Number/Name)** 2293 / *NATO Cooperative R & D*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
-Large Displacement Unmanned Undersea Vehicles (LD UUV) U.S. and Korea -Hull Treatments U.S. and United Kingdom (UK) -Low-Band Geolocation U.S. and Australia -ALQ-227 U.S. and Australia -Electromagnetic (EM) Silencing U.S. and United Kingdom (UK) -Australia/U.S. Expeditionary Modeling & Simulation Project Arrangement (AUSEMS) U.S. and Australia -Super Quantum Small Electromagnetic Sensor (QSES) U.S. and Australia -Buoyant Cable U.S. and United Kingdom -Allied Munitions Detection-Underwater Initiative (ALMOND-U) U.S. and Germany -Autonomous Maritime Asset Protection Systems (AMAPS) U.S. and United Kingdom -Ultra Heavy Lift Amphibious Connector (UHAC) U.S. and Singapore ***FY 2018 Base Plans:*** -Continue to support approved Cooperative projects from FY2016/FY2017. -Plan and support approved FY2018 Cooperative projects. Projects include: -Hull Treatments U.S. and United Kingdom (UK) -Low-Band Geolocation U.S. and Australia -ALQ-227 U.S. and Australia -Electromagnetic (EM) Silencing U.S. and United Kingdom (UK) -Super Quantum Small Electromagnetic Sensor (QSES) U.S. and Australia -Direct Energy Power Systems (DEPS) U.S. and United Kingdom -Buoyant Cable U.S. and United Kingdom -Allied Munitions Detection-Underwater Initiative (ALMOND-U) U.S. and Germany -Autonomous Maritime Asset Protection Systems (AMAPS) U.S. and United Kingdom -Ultra Heavy Lift Amphibious Connector (UHAC) U.S. and Singapore ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	8.320	9.867	9.099	0.000	9.099

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603790N / *NATO Research and Deve*	**Project (Number/Name)** 2293 / *NATO Cooperative R & D*

C. Other Program Funding Summary ($ in Millions)

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-2, RDT&E Budget Item Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603795N *I Land Attack Tech*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	14.584	0.887	6.015	33.568	-	33.568	43.713	40.906	47.818	48.769	Continuing	Continuing
2020: *Advanced Gun System Projectile*	0.000	0.000	0.000	18.000	-	18.000	0.000	0.000	0.000	0.000	0.000	18.000
2038: *ADVANCED MINOR CALIBER GUN*	14.584	0.887	0.573	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	16.044
3370: *Railgun*	0.000	0.000	5.442	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	5.442
3401: *Guided Projectile*	0.000	0.000	0.000	15.568	-	15.568	43.713	40.906	47.818	48.769	Continuing	Continuing

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. A round selection is planned for August 2017 where initial performance characteristics will be determined and subsequently matured through FY 2019. The capability is planned for Initial Operational Capability in 4QFY2021. This is not a new start.

Project 2038: The Advanced Minor Caliber Gun will support non-recurring engineering, component integration, and testing efforts required for capability upgrades to the MK38 Mod 2, a minor caliber gun weapon system.

Project 3401: The Hyper Velocity Projectile (HVP) Block (BLK) 0 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 2019. This includes development of system specifications and HVP BLK 0 interface control documents to support transition to MS B. HVP tactical subcomponent and integration risk reduction efforts will be initiated to support MS B Acquisition Milestone and Competitive E&MD Award. The Hyper Velocity 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.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy					Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*			R-1 Program Element (Number/Name) PE 0603795N *I Land Attack Tech*		
B. Program Change Summary ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**
Previous President's Budget	0.887	6.015	15.608	-	15.608
Current President's Budget	0.887	6.015	33.568	-	33.568
Total Adjustments	0.000	0.000	17.960	-	17.960
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Program Adjustments	0.000	0.000	17.937	-	17.937
• Rate/Misc Adjustments	0.000	0.000	0.023	-	0.023

Change Summary Explanation

Increase of +$18.023M supports establishment of project unit 2020 Advanced Gun System Projectile ($18.000M) and miscellaneous adjustments.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603795N / *Land Attack Tech*	Project (Number/Name) 2020 / *Advanced Gun System Projectile*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2020: *Advanced Gun System Projectile*	0.000	0.000	0.000	18.000	-	18.000	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, which was the original 155mm munition developed for the MK 51 GWS. The development 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. A round selection is planned for August 2017 where initial performance characteristics will be determined and subsequently matured through FY 2019. The capability is planned for Initial Operational Capability in 4QFY2021.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Systems Engineering and Design Verification	0.000	0.000	18.000	0.000	18.000
Articles:	-	-	-	-	-
FY 2016 Accomplishments: N/A					
FY 2017 Plans: N/A					
FY 2018 Base Plans: Baseline Interface Control Documents Baseline system specification for a 155mm guided projectile Initiate modifications to the guided projectile to support interface requirements Begin design on MK-51 Gun Weapon System modifications Begin design verification testing on MK-51 Gun Weapon System modifications Begin design verification testing for an alternate propelling charge system Complete alternate logical and electrical Critical Design Review for initialization conversion Complete a technology transfer to industry for the electrical and logical interface conversion					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603795N / *Land Attack Tech*	**Project (Number/Name)** 2020 / *Advanced Gun System Projectile*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Initiate development on system integration modifications ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.000	0.000	18.000	0.000	18.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Sole source selection based on capability, cost, technology maturity, cost, and ability to support Initial Operational Capability.

E. Performance Metrics

Development cost, unit cost, Initial Operational Capability

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603795N / *Land Attack Tech*	**Project (Number/Name)** 2020 / *Advanced Gun System Projectile*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Guided Projectile Modification Development	C/CPFF	TBD : Not Specified	0.000	0.000		0.000		3.200	Dec 2017	-		3.200	39.502	42.702	-
Propelling Charge Development	C/CPFF	TBD : Not Specified	0.000	0.000		0.000		2.655	Dec 2017	-		2.655	9.148	11.803	-
Munitions Container Development	C/CPFF	BAE Systems : Fridley, MN	0.000	0.000		0.000		2.100	Dec 2017	-		2.100	3.540	5.640	-
Munition Container Modification Development, Electrical	WR	NSWC Dahlgren : Dahlgren, VA	0.000	0.000		0.000		0.365	Oct 2017	-		0.365	0.200	0.565	-
Munitions Container and Propelling Charge Technical Data Package Modification	WR	NSWC IHEODTD : Picatinny, NJ	0.000	0.000		0.000		0.241	Oct 2017	-		0.241	0.246	0.487	-
Munitions Container and Propelling Charge Technical Data Package Modification	WR	NSWC CN : Corona, CA	0.000	0.000		0.000		0.075	Oct 2017	-		0.075	0.080	0.155	-
MK 51 Munition Container Modification Development, Software	MIPR	ARDEC : Picatinny, NJ	0.000	0.000		0.000		0.250	Oct 2017	-		0.250	0.100	0.350	-
MK 51 GWS Modification Development	C/CPFF	BAE Systems : Fridley, MN	0.000	0.000		0.000		5.068	Dec 2017	-		5.068	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		0.000		13.954		-		13.954	87.748	101.702	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Services Engineering	WR	NSWC Dahlgren : Dahlgren, VA	0.000	0.000		0.000		0.780	Oct 2017	-		0.780	1.251	2.031	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603795N / *Land Attack Tech*	Project (Number/Name) 2020 / *Advanced Gun System Projectile*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Services Engineering	WR	NSWC IHEOTD : Indian Head MD	0.000	0.000		0.000		0.790	Oct 2017	-		0.790	1.128	1.918	-
Government Services Engineering	WR	NSWC IHEOTD : Picatinny, NJ	0.000	0.000		0.000		0.626	Oct 2017	-		0.626	1.144	1.770	-
Government Services Engineering	WR	NAWC,CL : China Lake, CA	0.000	0.000		0.000		0.100	Oct 2017	-		0.100	0.181	0.281	-
		Subtotal	0.000	0.000		0.000		2.296		-		2.296	3.704	6.000	-

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test Analysis and Articles	MIPR	USAASC : Picatinny, NJ	0.000	0.000		0.000		0.500	Oct 2017	-		0.500	4.704	5.204	-
Test Range	MIPR	Dugway Proving Grounds : Dugway, UT	0.000	0.000		0.000		0.450	Oct 2017	-		0.450	0.900	1.350	-
Test Range	MIPR	Yuma Proving Grounds : Yuma, AZ	0.000	0.000		0.000		0.180	Oct 2017	-		0.180	0.300	0.480	-
Test Range	WR	Dahlgren Range : Dahlgren, VA	0.000	0.000		0.000		0.320	Oct 2017	-		0.320	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		0.000		1.450		-		1.450	8.648	10.098	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603795N / *Land Attack Tech*	Project (Number/Name) 2020 / *Advanced Gun System Projectile*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contract Support Services	C/CPFF	CACI : Arlington, VA	0.000	0.000		0.000		0.300	Oct 2017	-		0.300	0.900	1.200	-
		Subtotal	0.000	0.000		0.000		0.300		-		0.300	0.900	1.200	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		0.000		18.000		-		18.000	101.000	119.000	-

Remarks

FY 2019 and out on the R-4 RDT&E Schedule Profile is notional.

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603795N / *Land Attack Tech*	**Project (Number/Name)** 2020 / *Advanced Gun System Projectile*

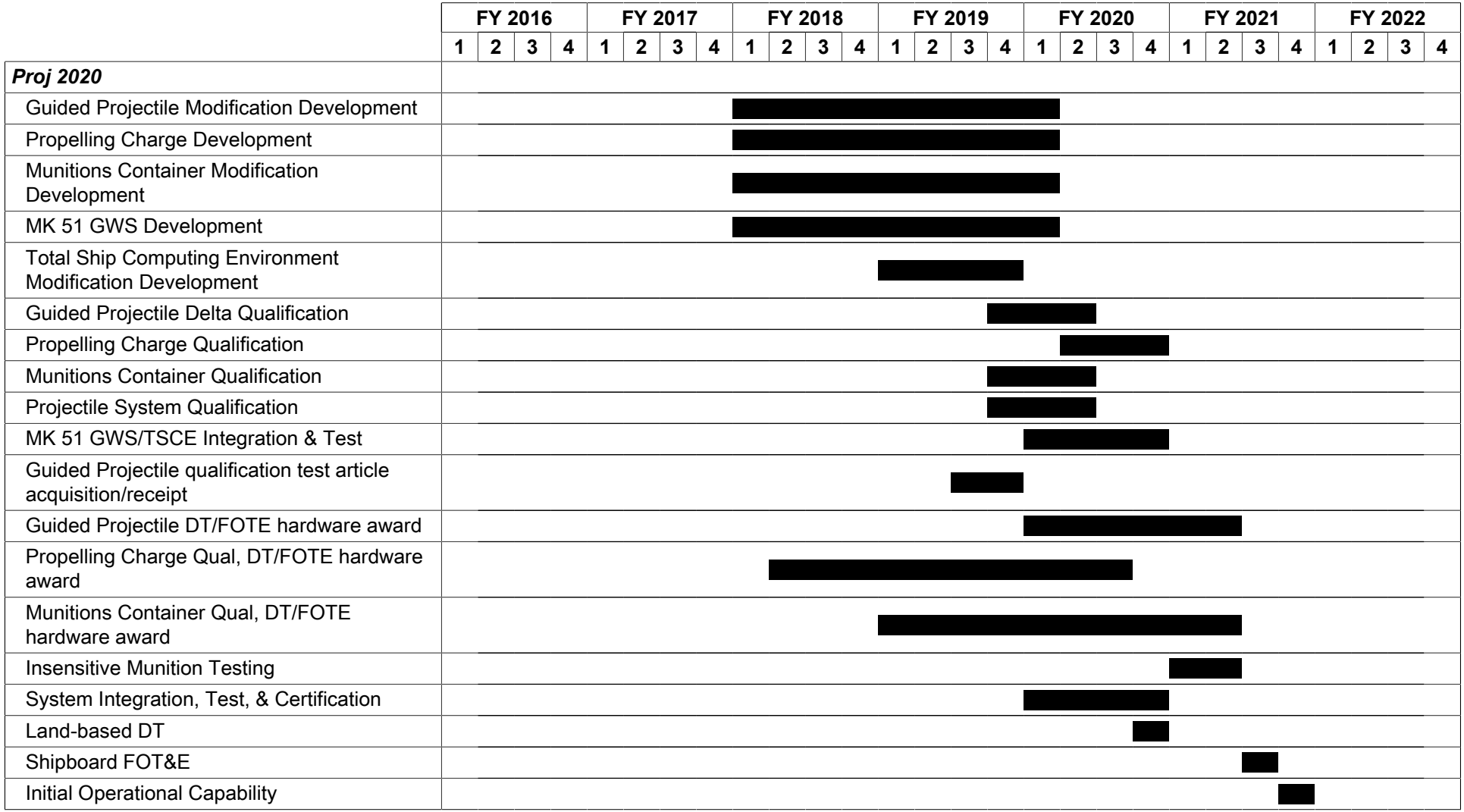

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603795N / *Land Attack Tech*	**Project (Number/Name)** 2020 / *Advanced Gun System Projectile*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2020				
Guided Projectile Modification Development	1	2018	1	2020
Propelling Charge Development	1	2018	1	2020
Munitions Container Modification Development	1	2018	1	2020
MK 51 GWS Development	1	2018	1	2020
Total Ship Computing Environment Modification Development	1	2019	4	2019
Guided Projectile Delta Qualification	4	2019	2	2020
Propelling Charge Qualification	2	2020	4	2020
Munitions Container Qualification	4	2019	2	2020
Projectile System Qualification	4	2019	2	2020
MK 51 GWS/TSCE Integration & Test	1	2020	4	2020
Guided Projectile qualification test article acquisition/receipt	3	2019	4	2019
Guided Projectile DT/FOTE hardware award	1	2020	2	2021
Propelling Charge Qual, DT/FOTE hardware award	2	2018	3	2020
Munitions Container Qual, DT/FOTE hardware award	1	2019	2	2021
Insensitive Munition Testing	1	2021	2	2021
System Integration, Test, & Certification	1	2020	4	2020
Land-based DT	4	2020	4	2020
Shipboard FOT&E	3	2021	3	2021
Initial Operational Capability	4	2021	4	2021

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603795N / *Land Attack Tech*	Project (Number/Name) 2038 / *ADVANCED MINOR CALIBER GUN*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2038: *ADVANCED MINOR CALIBER GUN*	14.584	0.887	0.573	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	16.044
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Advanced Minor Caliber Gun project will support 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.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Systems Engineering and Testing	0.887	0.573	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Executed majority of qualification test and implemented the hardware improvements for MOD 3 were integrated into new production orders starting in FY 2016.					
FY 2017 Plans: Complete MOD 3 qualification test and develop engineering changes based on results from sea trials.					
FY 2018 Base Plans: N/A					
FY 2018 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	0.887	0.573	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Hardware improvement based on engineering changes will be integrated into FY 2017 and future production orders.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603795N / *Land Attack Tech*	**Project (Number/Name)** 2038 / *ADVANCED MINOR CALIBER GUN*

E. Performance Metrics

Quarterly program reviews and semi-annual product certification panel reviews.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603795N / *Land Attack Tech*	Project (Number/Name) 3370 / *Railgun*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3370: *Railgun*	0.000	0.000	5.442	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	5.442
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Hyper Velocity Projectile (HVP) 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 HVP 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Systems Engineering and Testing	0.000	5.442	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2016 Accomplishments:					
The Hyper Velocity Projectile technology development was previously funded under the PE 0603925N / Directed Energy and Electronic Weapon Systems					
Initiated HVP BLK 0 Performance Specification Development					
Initiated MS B Documentation Development					
Initiated HVP Interface Requirements					
Initiated HVP Technical Risk Reduction Trade Studies					
Initiated System Engineering Plan					
Initiated Capabilities Development Document Trade Studies					
FY 2017 Plans:					
Continued development of technical requirements for 5-inch HVP.					
Preparation of acquisition documentation in preparation for Milestone B, including Acquisition Program Baseline (APB), Capabilities Development Document (CDD), Should Cost Report, Systems Engineering Plan (SEP), and Test & Evaluation Master Plan (TEMP).					
Complete Acquisition Strategy, Acquisition Plan, and Independent Cost Reviews.					
Conduct Mount Ordnance Alterations (ORDALT) and Combat System Engineering Trade Studies.					
Complete Independent Cost Review.					
Complete HVP Tactical Component Risk Reduction Report.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603795N / *Land Attack Tech*	**Project (Number/Name)** 3370 / *Railgun*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Initiate Tactical Subcomponent Risk Reduction Efforts. ***FY 2018 Base Plans:*** FY 2018 plans is funded under project 3401: Guided Projectile. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.000	5.442	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 2019.

E. Performance Metrics

Quarterly Program Reviews, Monthly Reports, and Periodic Design Reviews.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319 / 4					R-1 Program Element (Number/Name) PE 0603795N / *Land Attack Tech*				Project (Number/Name) 3401 / *Guided Projectile*			
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
3401: *Guided Projectile*	0.000	0.000	0.000	15.568	-	15.568	43.713	40.906	47.818	48.769	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Hyper Velocity Projectile (HVP) Block (BLK) 0 effort will double the range of the current 5-inch conventional ammunition while meeting multi-mission operational requirements for ASuW, AAW, and Naval Surface Fire Support (NSFS). This project executes pre MS B activities and begins preparations for the Engineering, Manufacturing, and Development Phase planned for FY 2019. This includes development of system specifications and HVP BLK 0 interface control documents to support transition to Milestone B (MS B). HVP tactical subcomponent and integration risk reduction efforts will be initiated to support MS B Acquisition Milestone and Competitive E&MD Award. The Hyper Velocity 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).

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**
Title: Systems Engineering and Testing	0.000	0.000	15.568	0.000	15.568
Articles:	-	-	-	-	-
FY 2016 Accomplishments: FY 2016 HVP was funded under PE 0603925N / Directed Energy and Electronic Weapon Systems (Proj. 3370 Railgun).					
FY 2017 Plans: FY 2017 HVP was funded PE 0603795N / Land Attack Tech (Proj. 3370 Railgun).					
FY 2018 Base Plans: Finalize and publish Request for Proposals for Engineering, Manufacturing, and Development award. Evaluate technical and cost proposals. Continue development of HVP Mechanical and Electrical Interface Control Documentation (ICDs) Complete HVP Tactical Subcomponent Risk Reduction Development Efforts. Test MK 45 Mod 4 Initialization and Gun Mount Prototypes verifying interfaces and specifications. Complete documentations required for MS B Entrance Criteria. Finalize Risk Reduction Studies.					
FY 2018 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	0.000	0.000	15.568	0.000	15.568

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603795N / *Land Attack Tech*	**Project (Number/Name)** 3401 / *Guided Projectile*

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: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603795N / *Land Attack Tech*	Project (Number/Name) 3401 / *Guided Projectile*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 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		0.000		0.875	Nov 2017	-		0.875	Continuing	Continuing	Continuing
HVP Tactical Development	WR	DOTC Competitively Selected Commercial Vendor : TBD	0.000	0.000		0.000		8.446	Dec 2017	-		8.446	Continuing	Continuing	Continuing
MK 45 Gun Systems integration ORDALT Development	C/CPFF	BAE Systems : Minneapolis, MN	0.000	0.000		0.000		0.825	Nov 2017	-		0.825	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		10.146		-		10.146	-	-	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Engineering Services	WR	NSWC DD : Dahlgren, VA	0.000	0.000		0.000		3.642	Oct 2017	-		3.642	Continuing	Continuing	Continuing
Government Engineering Services	WR	NSWC Indian Head picatinny Detachment : Picatinny Arsenal, NJ	0.000	0.000		0.000		1.180	Nov 2017	-		1.180	Continuing	Continuing	Continuing
Government Engineering Services	WR	COTF/MCOTEA : Norfolk, VA	0.000	0.000		0.000		0.100	Nov 2017	-		0.100	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		4.922		-		4.922	-	-	-

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Support Services	C/CPFF	ALION : Washington, DC	0.000	0.000		0.000		0.500	Jan 2018	-		0.500	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		0.500		-		0.500	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603795N / *Land Attack Tech*	Project (Number/Name) 3401 / *Guided Projectile*	

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		0.000		15.568		-		15.568	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603795N / *Land Attack Tech*	**Project (Number/Name)** 3401 / *Guided Projectile*

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Exhibit R-4, RDT&E Schedule Profile: PB 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 04	**R-1 Program Element (Number/Name)** PE 0603795N / *Land Attack Tech*	**Project (Number/Name)** 3401 / *Guided Projectile*

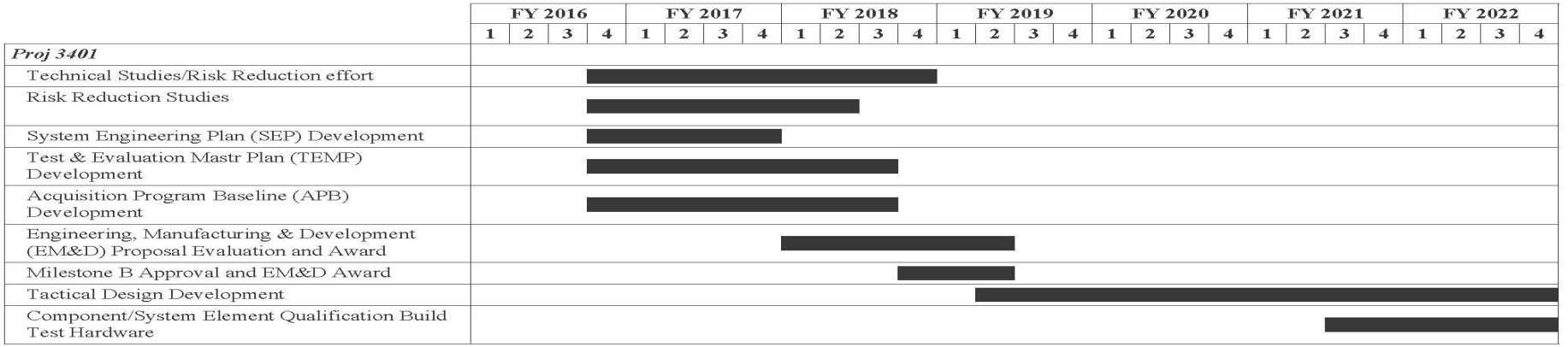

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603795N / *Land Attack Tech*	**Project (Number/Name)** 3401 / *Guided Projectile*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3401				
Technical Studies/Risk Reduction effort	4	2016	4	2018
Risk Reduction Studies	4	2016	2	2018
System Engineering Plan (SEP) Development	4	2016	4	2017
Test & Evaluation Mastr Plan (TEMP) Development	4	2016	3	2018
Acquisition Program Baseline (APB) Development	4	2016	3	2018
Milestone B Approval and E&MD Award	4	2018	1	2019
Tactical Design Development	1	2019	4	2022
Component/System Element Qualification Build Test Hardware	1	2021	4	2022

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603851M *I Joint Non-Lethal Weapons Testing*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	493.120	27.976	27.904	29.873	-	29.873	28.305	29.274	28.874	30.515	Continuing	Continuing
2319: *Non-Lethal Weapons*	493.120	27.976	27.904	29.873	-	29.873	28.305	29.274	28.874	30.515	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: FY 2018 Navy					Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*		**R-1 Program Element (Number/Name)** PE 0603851M *I Joint Non-Lethal Weapons Testing*			
B. Program Change Summary ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**
Previous President's Budget	29.444	27.904	29.698	-	29.698
Current President's Budget	27.976	27.904	29.873	-	29.873
Total Adjustments	-1.468	0.000	0.175	-	0.175
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.794	0.000			
• SBIR/STTR Transfer	-0.674	0.000			
• Program Adjustments	0.000	0.000	0.000	-	0.000
• Rate/Misc Adjustments	0.000	0.000	0.175	-	0.175

Change Summary Explanation

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.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603851M / *Joint Non-Lethal Weapons Testing*	Project (Number/Name) 2319 / *Non-Lethal Weapons*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2319: *Non-Lethal Weapons*	493.120	27.976	27.904	29.873	-	29.873	28.305	29.274	28.874	30.515	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Counter-Personnel Advanced Component Development and Prototypes	11.303	14.036	12.033	0.000	12.033
Articles:	-	-	-	-	-
FY 2016 Accomplishments: - Continued coordination and requirements development for Service counter-personnel (CP) prototyping initiatives within the JNLWP. This includes SOCOM and USCG. - Continued development and assessment of Service-led CP NL prototype initiatives. - 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. - Continued the advanced development of CP emerging technologies to support Service capability gaps and priorities as they support the Combatant Commanders. - Continued technology maturation and risk reduction of competing approaches to inform decisions for Service capability development. - Continued prototype development and assessment of advanced payloads for technological capabilities relevant to emerging counter-personnel capability gaps.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603851M / *Joint Non-Lethal Weapons Testing*	**Project (Number/Name)** 2319 / *Non-Lethal Weapons*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Continued prototype development and demonstration for the most promising technologies employing multisensory stimuli. Specifically, completed prototype development of the multi-bang flashbang grenade and the Distributed Sound and Light Array (DSLA). - Continued program management support for CP efforts. - Mission Payload Module (MPM) Engineer and Manufacturing Development contract terminated for convenience and returned to Technology Maturation and Risk Reduction acquisition phase. - Initiated munitions testing and acquisition documentation of NL capability to deny, move and suppress individuals at long ranges from currently fielded weapons systems. ***FY 2017 Plans:*** - Continue all efforts from FY 2016 except those noted as completed. ***FY 2018 Base Plans:*** - Continue all efforts from FY 2017 except those noted as completed. ***FY 2018 OCO Plans:*** N/A					
Title: Counter-Materiel Advanced Component Development and Prototypes	10.545	9.883	11.336	0.000	11.336
Articles:	-	-	-	-	-
FY 2016 Accomplishments: - Continued coordination and requirements development for Service counter-material (CM) prototyping initiatives within the JNLWP. This includes SOCOM and USCG. - Continued development and assessment of Service-led CM NL prototype initiatives. - 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. - Continued the advanced development of Counter-Materiel emerging technologies to support Service capability gaps and priorities as they support the Combatant Commanders. - Continued technology maturation and risk reduction of competing approaches to inform decisions for Service capability					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603851M / *Joint Non-Lethal Weapons Testing*	**Project (Number/Name)** 2319 / *Non-Lethal Weapons*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
development. - Continued prototype development and assessment of advanced payloads for technological capabilities relevant to emerging counter-materiel capability gaps. - Continued program management support for CM efforts. - Initiated 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. ***FY 2017 Plans:*** - Continue all efforts from FY 2016 except those noted as completed. - Initiate production qualification testing of a Service-endorsed pre-emplaced, counter-materiel, counter vehicle stopping capability. ***FY 2018 Base Plans:*** - Continue all efforts from FY 2017 except those noted as completed. - Initiate Critical Design Review for counter material: Radio Frequency vehicle stopper prototype capability ***FY 2018 OCO Plans:*** N/A					
Title: Joint and Allied Exercise, Experimentation, Demonstration and Assessment	6.128	3.985	6.504	0.000	6.504
Articles:	-	-	-	-	-
FY 2016 Accomplishments: - 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. - 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. - 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					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603851M / *Joint Non-Lethal Weapons Testing*	**Project (Number/Name)** 2319 / *Non-Lethal Weapons*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
the 2015 NATO Non-Lethal Technology Exercise - Maritime (NNTEX-15M). - Continued interaction with Combatant Commander staffs to evaluate emerging NLW capabilities and their utility in theater operations and Defense of the Homeland missions. - 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. - Continued to identify, test, and evaluate newly developed commercial products that may meet Joint service requirements for specific non-lethal capability set common items. Specifically, certified a two-way translation device for Service capability sets. - Continued program management support for Joint and Allied Exercise, Experimentation, Demonstration and Assessment efforts. - Initiated support of 3 Combatant Commanders (CCMD) with demonstrating and assessing NLW capabilities for port opening operations; Humanitarian Assistance and Disaster Relief (HA/DR) and Counter-Transnational Organized Crime (CTOC) operations; and harbor and in-transit security operations. ***FY 2017 Plans:*** - Continue all efforts from FY 2016 except those noted as completed. - Complete demonstration and assessment of port opening operations and in-transit security operations. - Complete 2016 NATO Non-Lethal Technology Exercise - Land (NNTEX-16L) - Initiate support of two CCMDs with demonstrating and assessing NLW capabilities for vessel interdiction and counter-migration exercises. ***FY 2018 Base Plans:*** - Continue all efforts from FY 2017 except those noted as completed. - Initiate Concept Development Assessment Game in support of the NATO Defense Against Terrorism 2017-18 Program of Work. - Initiate leadership of the NATO Special Area Study 133 (SAS-133) panel addressing NL effects against Unmanned Aerial Systems (UAS). ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	27.976	27.904	29.873	0.000	29.873

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603851M / *Joint Non-Lethal Weapons Testing*	**Project (Number/Name)** 2319 / *Non-Lethal Weapons*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• PE 0602651M: *Joint Non-Lethal Weapons Applied Research*	5.956	6.327	6.425	-	6.425	6.425	6.425	6.425	6.553	Continuing	Continuing
• PE 0603651M: *Joint Non-Lethal Weapons Advanced Technology Development*	12.374	13.117	13.448	-	13.448	13.387	13.387	13.387	13.655	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 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: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603851M / *Joint Non-Lethal Weapons Testing*	**Project (Number/Name)** 2319 / *Non-Lethal Weapons*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
NLW Product Development	MIPR	ARDEC : Picatinny, NJ	53.647	1.085	Oct 2015	1.010	Oct 2016	1.129	Oct 2017	-		1.129	Continuing	Continuing	Continuing
NLW Product Development	MIPR	SOCOM : McDill AFB, FL	25.815	0.250	Oct 2015	0.275	Oct 2016	0.283	Oct 2017	-		0.283	Continuing	Continuing	Continuing
NLW Product Development	Various	NSWC : Various	37.334	4.930	Oct 2015	4.688	Oct 2016	4.829	Oct 2017	-		4.829	Continuing	Continuing	Continuing
NLW Product Development	MIPR	USAF : Ft. Sam Houston AFB, TX	57.509	0.707	Oct 2015	0.670	Oct 2016	0.690	Oct 2017	-		0.690	Continuing	Continuing	Continuing
NLW Product Development	Various	MCSC : Quantico, VA	31.033	1.254	Oct 2015	1.432	Oct 2016	1.475	Oct 2017	-		1.475	Continuing	Continuing	Continuing
NLW Product Development	Various	Uniformed Services : Various	156.649	10.993	Oct 2015	10.918	Oct 2016	12.442	Oct 2017	-		12.442	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	427.388	19.219		18.993		20.848		-		20.848	-	-	-

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 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
NLW Support Cost	WR	NSWC : Dahlgren, VA	16.198	0.576	Oct 2015	0.600	Oct 2016	0.618	Oct 2017	-		0.618	Continuing	Continuing	Continuing
		Subtotal	16.198	0.576		0.600		0.618		-		0.618	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603851M / *Joint Non-Lethal Weapons Testing*	**Project (Number/Name)** 2319 / *Non-Lethal Weapons*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
JNLW Management Support	Various	MCSC : Quantico, VA	8.813	8.181	Oct 2015	8.311	Oct 2016	8.407	Oct 2017	-		8.407	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	49.534	8.181		8.311		8.407		-		8.407	-	-	-

Remarks

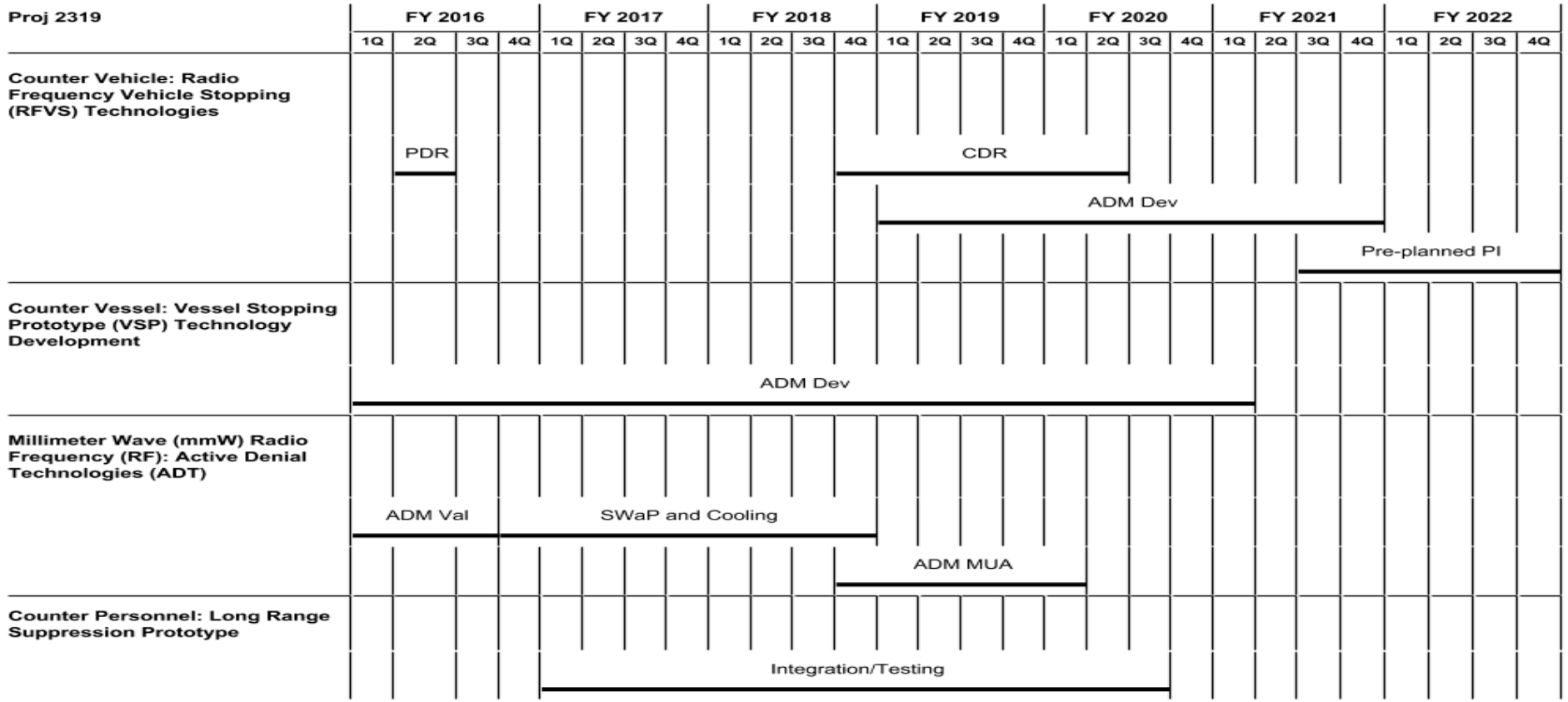
The JNLW Management Support was previously incorporated into the various cost categories instead of being displayed in the corresponding section of the R-3. The Management Services section of the R-3 now reflects the amounts for civilian salaries and contractor program management. The funding fluctuates across the R-2A categories based on the demand signals of the Services, USSOCOM, and the USCG.

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	493.120	27.976		27.904		29.873		-		29.873	-	-	-

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: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603851M / *Joint Non-Lethal Weapons Testing*	**Project (Number/Name)** 2319 / *Non-Lethal Weapons*



2018DON - 0603851M - 2319

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603851M / *Joint Non-Lethal Weapons Testing*	**Project (Number/Name)** 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: Preliminary Design Review	2	2016	2	2016
Counter Vehicle: Radio Frequency Vehicle Stopping (RFVS) Technologies: Critical Design Review	4	2018	2	2020
Counter Vehicle: Radio Frequency Vehicle Stopping (RFVS) Technologies: Advanced Demonstration Model (ADM) Development	1	2019	4	2021
Counter Vehicle: Radio Frequency Vehicle Stopping (RFVS) Technologies: Pre-planned Product Improvement	3	2021	4	2022
Counter Vessel: Vessel Stopping Prototype (VSP) Technology Development: Advanced Demonstration Model (ADM) Development	1	2016	1	2021
Millimeter Wave (mmW) Radio Frequency (RF): Active Denial Technologies (ADT): Advanced Demonstration Model (ADM) Validation	1	2016	3	2016
Millimeter Wave (mmW) Radio Frequency (RF): Active Denial Technologies (ADT): Size Weight Power and Cooling Improvements	4	2016	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: Marking Dye Integration; Ballistics and qualification testing	1	2017	3	2020

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603860N *I JT Precision Approach & Ldg Sys*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	943.438	80.313	104.144	106.391	-	106.391	103.549	52.025	33.816	29.722	Continuing	Continuing
2329: *JPALS*	943.438	80.313	104.144	106.391	-	106.391	103.549	52.025	33.816	29.722	Continuing	Continuing
Program MDAP/MAIS Code: **Project MDAP/MAIS Code(s):** 238												

A. Mission Description and Budget Item Justification

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 Effort includes 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 environment.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	81.466	104.144	104.954	-	104.954
Current President's Budget	80.313	104.144	106.391	-	106.391
Total Adjustments	-1.153	0.000	1.437	-	1.437
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.153	0.000			
• Program Adjustments	0.000	0.000	1.057	-	1.057
• Rate/Misc Adjustments	0.000	0.000	0.380	-	0.380

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603860N *I JT Precision Approach & Ldg Sys*

Change Summary Explanation

Technical: N/A

Schedule: Updated the schedule to add JPALS installation and support for USS WASP (LHD-1) operational deployment beginning in FY17. Updated schedule to show JPALS EOC date shift from Q1 to Q4FY18 based on completion of F-35 Block 3F OT periods completing later in FY18. This has no impact on the JPALS program of record as the JPALS program is in a supporting role to F-35 OT periods and these efforts are funded by the F-35 program. All efforts to install JPALS ship systems (EDMs) and be prepared to support F-35 OT periods are either completed or on schedule. Updated schedule to show F-35 Program decision to integrate JPALS 2-way capability in F-35 Block 4.3 vice Block 4.1. JPALS UHF Data Broadcast (UDB) Precision Approach capability remains in F-35 Block 3F for installations and operational deployments beginning in FY17. The F-35 costs for Block 4 integration of JPALS capability are funded by the individual platform program offices and are maintained in their budget. The JPALS Component Cost Position and Acquisition Performance Baseline schedule milestones have already accounted for JPALS 2-way integration in F-35 Block 4.1, 4.2, or 4.3. For IOT&E and OTRR, a more detailed schedule was included in OSD18 compared to PB17. The IOT&E Phase 1 and supporting OTRR for EOC in 2Q FY18 was included in the schedule, aligned with the F-35 Block 3F shipboard OT periods. The IOT&E Phase 2 and supporting OTRR that were depicted in the PB17 in 2Q FY20 has been aligned to match the F-35 Block 4.3 shipboard OT periods which are beyond the FYDP (FY24).

Financial: FY18 increase in JPALS addresses broadened CyberSecurity requirements to remain compliant with software CyberSecurity directives and Information Assurance mandates.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603860N / *JT Precision Approach & Ldg Sys*	Project (Number/Name) 2329 / *JPALS*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2329: *JPALS*	943.438	80.313	104.144	106.391	-	106.391	103.549	52.025	33.816	29.722	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

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. The FY 2018 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 Sea-Based JPALS on CVN and LHA/D ships in accordance with the Joint Requirements Oversight Council(JROC) Mar 2016 approved JPALS Capability Development Document (CDD) Update. 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: JPALS Ship Systems and Test	75.163	98.749	100.955	0.000	100.955
Articles:	-	2	-	-	-
Description: JPALS provides for development, integration, installation, and test of Sea-Based JPALS on CVN and LHA/D ships.					
FY 2016 Accomplishments: Completed Integrated Logistics Assessment (ILA) in 1st quarter. Completed required acquisition and technical reviews and documentation to support Milestone B decision. Completed System Functional Review (SFR) in 1st quarter and Preliminary Design Review (PDR) in 2nd quarter. Accomplished Milestone B in 3rd quarter. Awarded Engineering					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603860N / *JT Precision Approach & Ldg Sys*	**Project (Number/Name)** 2329 / *JPALS*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Manufacturing and Development (EMD) contract in 4th quarter. Continued Prototype Risk Reduction testing in preparation for Critical Design Review (CDR) in FY17. Completed F-35C DT-2 and DT-3 testing supporting JPALS EOC in 1Q and 4Q respectively. ***FY 2017 Plans:*** Continue JPALS lab and shore based development and test activities in preparation for CDR and JPALS shipboard Integrated Test (IT). Fund procurement of two additional Engineering Development Models (EDM) to support F-35 EOC operational deployments and JPALS Integrated Test (IT) and OT testing requirements. Complete phase 1 development of JPALS Test Bed (JTB) to support shore based and shipboard IT. Perform Initial Baseline Review (IBR) for the JPALS EMD contract in the 2nd quarter. Perform CDR in 3rd quarter. Install cabling, foundations and EDMs on CVN and LHA/D for JPALS Integrated Test (IT) and preparation for F-35 shipboard operational testing. Begin preparations for JPALS IOT&E phase 1 to support EOC. ***FY 2018 Base Plans:*** 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-35 operational deployments and EOC. Support F-35B preparation for and operational deployments. Perform M-Demo in 4th quarter. Address broadened cyber-security requirements to remain compliant with software cyber-security directives and information assurance mandates. ***FY 2018 OCO Plans:*** N/A					
Title: Joint Strike Fighter (JSF) F-35B Marine Corp STOVL and F-35C Navy Carrier Variant Support	3.750	3.973	3.999	0.000	3.999
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 documentation to certify shipboard all weather precision approach capability for F-35 operational test and deployments.					
FY 2016 Accomplishments:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603860N / *JT Precision Approach & Ldg Sys*	**Project (Number/Name)** 2329 / *JPALS*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Supported JPALS capability integration on F-35B/C. Supported shore based lab and developmental flight testing for F-35B/ C. Completed F-35C DT-2 and DT-3 on CVNs. Developed initial procedures and draft documents for JPALS UHF Data Broadcast (UDB) capability certification for F-35B/C to support operational test and operational deployments. ***FY 2017 Plans:*** Support F35-B DT-3 on an LHA. Prepare for shipboard operational testing on CVN and LHA/D of F-35B and F-35C with JPALS. Complete JPALS UHF Data Broadcast (UDB)certification process and documentation to prepare for JPALS Operational Test Readiness Review (OTRR) F-35 operational test and EOC deployments in FY17 and FY18 respectively. ***FY 2018 Base Plans:*** Support F-35B/C shipboard OT results and analysis. Support preparation for and operational F-35 deployments ***FY 2018 OCO Plans:*** N/A					
Title: MQ-25 Support ***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. ***FY 2016 Accomplishments:*** Continued development of integration specifications, test requirements and planning in support of MQ-25 concept refinement, risk reduction activities and RFP release. ***FY 2017 Plans:*** Continue development of integration specifications, test documentation and planning in support of MQ-25 concept refinement activities. Support MQ-25 system requirements review for JPALS integration and MQ-25 RFP release. ***FY 2018 Base Plans:*** Support MQ-25 risk reduction activities, MS B efforts, and the beginning of Engineering and Manufacturing	1.400 -	1.422 -	1.437 -	0.000 -	1.437 -

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603860N / *JT Precision Approach & Ldg Sys*	**Project (Number/Name)** 2329 / *JPALS*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Development phase activities to integrate and test JPALS capabilities. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	80.313	104.144	106.391	0.000	106.391

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• OPN/2867: *JPALS*	0.000	0.000	0.000	-	0.000	38.573	63.065	66.948	10.489	192.977	372.052

Remarks

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.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603860N / *JT Precision Approach & Ldg Sys*	**Project (Number/Name)** 2329 / *JPALS*

E. Performance Metrics

Critical Design Review (CDR) scheduled for third quarter FY17. Milestone C scheduled for second quarter FY19.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603860N / *JT Precision Approach & Ldg Sys*	Project (Number/Name) 2329 / *JPALS*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Ship Integration	WR	NAWCAD : Pax River, MD	36.815	9.153	Dec 2015	9.424	Nov 2016	12.482	Nov 2017	-		12.482	Continuing	Continuing	Continuing
Primary Hardware Development - EMD Phase I	C/CPIF	Raytheon : Fullerton, CA	374.057	36.124	Nov 2015	0.000		0.000		-		0.000	0.000	410.181	410.181
Primary Hardware Development - New EMD Contract	C/CPIF	Raytheon : Fullerton, CA	0.000	3.199	Aug 2016	62.697	Nov 2016	60.693	Nov 2017	-		60.693	161.077	287.666	287.666
Risk Reduction for Auto-land - ARC-210	C/CPFF	RCI : Cedar Rapids, IA	3.029	1.743	Dec 2015	0.331	Nov 2016	0.000		-		0.000	1.936	7.039	7.039
Risk Reduction for Auto-land - FFRDC Support	FFRDC	JHU : Laurel, MD	0.493	0.000	Oct 2015	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	664.264	50.219		72.452		73.175		-		73.175	-	-	-

Remarks

The Primary Hardware Development contract with Raytheon is a CPIF contract. Primary Hardware Development funding increases in FY17 due to contractor commencing new EMD work post MS-B and beginning the production of two additional Engineering Demonstration Models (EDMs) that support testing requirements and EOC operational deployments for F-35. Ship integration increase from FY17 to FY18 is due to greater number of ships that will have integration work done in FY18 than in FY17. Will also address broadened cyber-security requirements in FY18.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering Support	WR	NAWCAD : Pax River, MD	143.688	16.173	Dec 2015	16.551	Nov 2016	16.822	Nov 2017	-		16.822	Continuing	Continuing	Continuing
Integrated Logistics Support	WR	NAWCAD : Pax River, MD	22.792	2.509	Dec 2015	2.617	Nov 2016	2.659	Nov 2017	-		2.659	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	187.994	18.682		19.168		19.481		-		19.481	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603860N / *JT Precision Approach & Ldg Sys*	Project (Number/Name) 2329 / *JPALS*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	NAWCAD : Pax River, MD	54.250	7.373	Dec 2015	8.116	Nov 2016	9.044	Nov 2017	-		9.044	Continuing	Continuing	Continuing
Operational Test & Evaluation	WR	COMOPTEVFOR : Norfolk, VA	3.497	0.402	Dec 2015	0.418	Nov 2016	0.637	Nov 2017	-		0.637	Continuing	Continuing	Continuing
		Subtotal	57.747	7.775		8.534		9.681		-		9.681	-	-	-

Remarks

Increase of Developmental Test and Evaluation(DT&E) funding between FY16 and FY17 due to scheduled start of JPALS IT-B testing. Increase of DT&E funding between FY17 and 18 due to continued JPALS integration testing and performing JPALS IT-B, IT-B1, IT-B2, and IT-B3.

Management Services ($ in Millions)

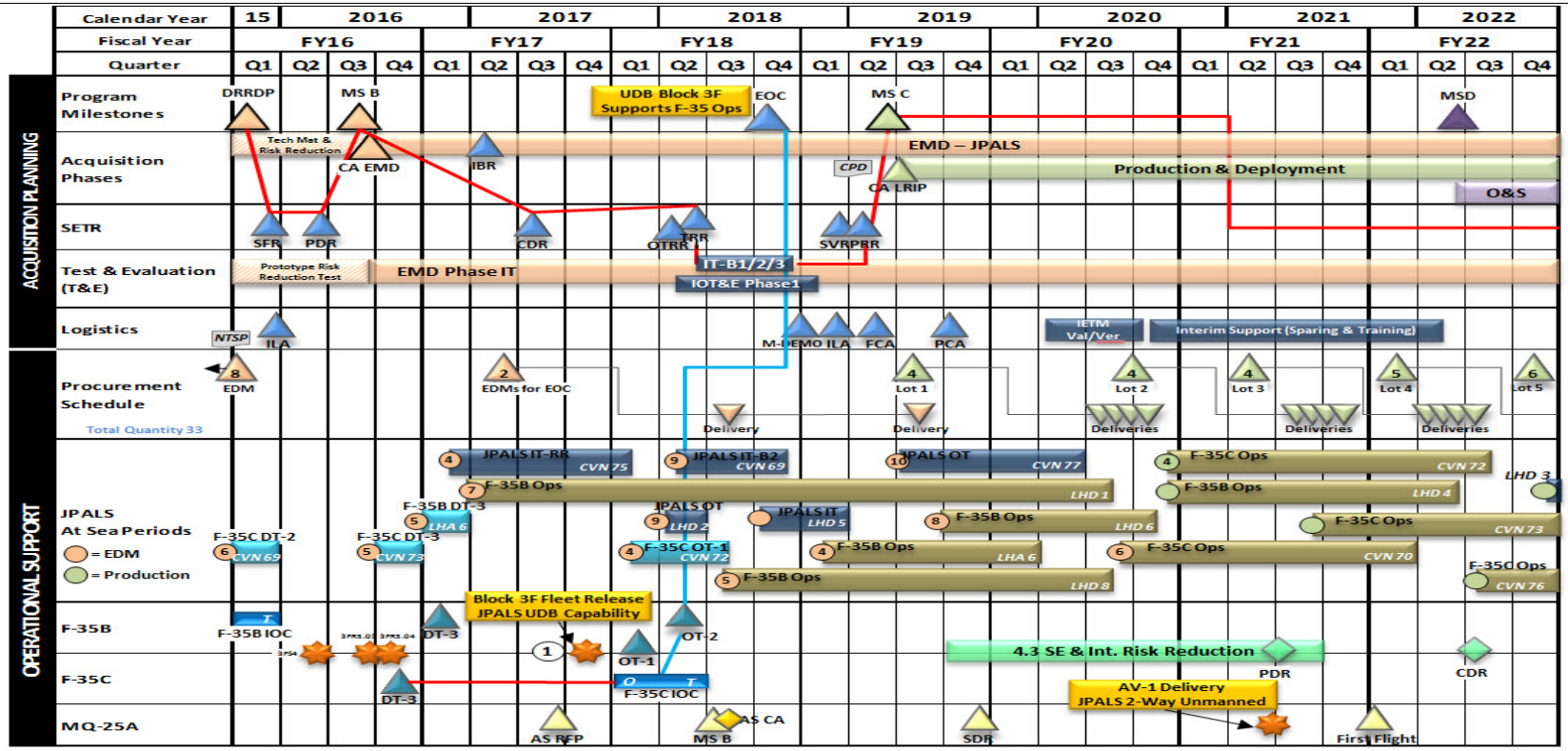
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	WR	NAWCAD : Pax River, MD	16.916	2.865	Dec 2015	2.988	Nov 2016	3.035	Nov 2017	-		3.035	Continuing	Continuing	Continuing
PM Support-MSS	C/CPFF	Amelex : Pax River, MD	12.690	0.548	Dec 2015	0.795	Nov 2016	0.808	Nov 2017	-		0.808	1.302	16.143	16.131
PM Support-MSS	C/CPFF	Avian : Pax River, MD	1.592	0.000	Dec 2015	0.000		0.000		-		0.000	0.000	1.592	1.592
PM Support-MSS	C/CPFF	SAIC : Pax River, MD	2.053	0.154	Dec 2015	0.139	Nov 2016	0.141	Nov 2017	-		0.141	0.182	2.669	2.669
Travel	WR	NAVAIR : Pax River, MD	0.182	0.070	Dec 2015	0.068	Nov 2016	0.070	Nov 2017	-		0.070	Continuing	Continuing	Continuing
		Subtotal	33.433	3.637		3.990		4.054		-		4.054	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	943.438	80.313		104.144		106.391		-		106.391	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603860N / *JT Precision Approach & Ldg Sys*	**Project (Number/Name)** 2329 / *JPALS*

JPALS Program
MS C Schedule



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Notes:
(1) F-35B/C Block 3F Software includes JPALS one-way capability (UHF Data Broadcast (UDB))

Legend:
- Critical Path to JPALS IOC
- Critical Path to F-35 JPALS EOC
- O=Objective, T=Threshold
- EDM Procurement
- Lot Buys

Revision Date: 15 March 17
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Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603860N / *JT Precision Approach & Ldg Sys*	**Project (Number/Name)** 2329 / *JPALS*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
JPALS				
Acquisition Milestones: MS B	3	2016	3	2016
Acquisition Milestones: Development RFP Release Decision Point (DRRDP)	1	2016	1	2016
Acquisition Milestones: MS C	2	2019	2	2019
Acquisition Milestones: Early Operating Capability (EOC)	4	2018	4	2018
Systems Development: Engineering and Manufacturing Development	3	2016	4	2022
Systems Development: Tech Maturity and Risk Reduction	1	2016	3	2016
Systems Development: Reviews: Critical Design Review (CDR)	3	2017	3	2017
Systems Development: Reviews: Preliminary Design Review (PDR)	2	2016	2	2016
Systems Development: Contract Awards: LRIP Contract Award	3	2019	3	2019
Systems Development: Contract Awards: New EMD Contract Award	4	2016	4	2016
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

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy												Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603925N *I Directed Energy and Electric Weapon System*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	58.503	41.355	32.700	107.310	-	107.310	117.907	78.621	48.042	32.202	Continuing	Continuing
3370: *Railgun*	45.699	31.980	23.776	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	101.455
3402: *Surface Navy Laser Weapon System (SNLWS)*	0.000	0.000	0.000	63.281	-	63.281	83.807	60.221	45.942	30.062	Continuing	Continuing
9823: *Lasers for Navy applicat*	12.804	9.375	8.924	44.029	-	44.029	34.100	18.400	2.100	2.140	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).

The funding decrease from FY17 to FY18 reflects delay for evaluation of transition opportunities focused on component technologies and ship integration risk reduction. Further, Hypervelocity Projectile into 5" conventional guns has been prioritized as risk reduction (funded in PE 0603795N Land Attack Technology PU 3401) on the path to Railgun component technologies maturation.

Project 3402 - Surface Navy Laser Weapon System (SNLWS): SNLWS funding is requested for the expedited development and fielding of the SNLWS system to Naval Forces. SNLWS will include the development of an advanced prototype laser weapon system in the 60 kW or higher class. SNLWS leverages mature technology

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603925N *I Directed Energy and Electric Weapon System*

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 Low Power Module (LPM), 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 increase from FY17 to FY18 reflects the establishment of Surface Navy Laser Weapon System (SNLWS) prototype development efforts.

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, and could provide enhanced ISR and Battle Damage Assessment (BDA) capabilities 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, procurement of long lead material, assembly and checkout, system certification, and platform integration/installation.

The increased funding in FY 2018 reflects a change in project direction from a single module attached to the Office of Naval Research's SSL Technical Maturation (SSL-TM) efforts to the design and procurement of eight standalone units for deployment on DDG 51 surface combatants. The increased funding is for the non-recurring 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	41.730	32.700	33.828	-	33.828
Current President's Budget	41.355	32.700	107.310	-	107.310
Total Adjustments	-0.375	0.000	73.482	-	73.482
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.375	0.000			
• Program Adjustments	0.000	0.000	73.656	-	73.656
• Rate/Misc Adjustments	0.000	0.000	-0.174	-	-0.174

Change Summary Explanation

The FY18 Program Adjustment in the amount of +73.5 million is a result of the following:

+$63.5 million Project 3402 - This increase reflects the first year of funding for the establishment of a Project Unit (PU) for the Surface Navy Laser Weapon System (SNLWS). Funding will support the initiation of the development of SNLWS prototype efforts.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603925N *I Directed Energy and Electric Weapon System*

-$24.4 million Project 3370 - The removal of the Railgun Investment reflects delay for evaluation of transition opportunities focused on component technologies and ship integration risk reduction. Further, Hypervelocity Projectile into 5" conventional guns has been prioritized as risk reduction (funded in PE 0603795N Land Attack Technology Project 3401 Guided Projectile) on the path to Railgun component technologies maturation. Railgun funding will continue to remain active in S&T PEs under the Office of Naval Research.

+$34.5 million Project 9823 - This increase supports the change in project direction from a single module attached to the Office of Naval Research's (ONR's) Solid State Laser Technology Maturation (SSL TM) efforts to the first year of the design and procurement of eight stand alone units for deployment on DDG 51 surface combatants.

-$0.2 million decrease reflects miscellaneous adjustments.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603925N / *Directed Energy and Electric Weapon System*	Project (Number/Name) 3370 / *Railgun*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3370: *Railgun*	45.699	31.980	23.776	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	101.455
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).

The funding decrease from FY17 to FY18 reflects delay for evaluation of transition opportunities focused on component technologies and ship integration risk reduction. Further, Hypervelocity Projectile into 5" conventional guns has been prioritized as risk reduction (funded in PE 0603795N PU 3401) on the path to Railgun component technologies maturation.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Railgun	31.980	23.776	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2016 Accomplishments:					
- Commissioned the first RDT&E Railgun launcher based on the design of the S&T Railgun developed by ONR. This is the first critical step in proving a repeatable design.					
- Accepted delivery and qualification of the first two pulse power vans for planned integration at White Sands Missile Range (WSMR).					
- Awarded a contract for site improvements at White Sands Missile Range (WSMR) to support long-term Railgun and Powder gun testing intended to ensure commonality of the Hypervelocity Projectile between the two launching methodologies.					
- Awarded contract to build Railgun test assembly for WSMR.					
- Awarded contracts to 2 vendors via the Defense Ordnance Technology Consortium (DOTC) to develop prototype engineering models for the Pulse Current Transfer (PCT) subsystem of a future Railgun Mount. The					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 3370 / *Railgun*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
PCT is assessed as the highest risk engineering challenge towards integrating a fully articulated Railgun mount into any existing platform. - Transitioned management of the Program to PEO IWS. ***FY 2017 Plans:*** - Manufactured Bridge Rectifying Charging Containers for WSMR test site. - Completed acceptance testing for Pulsed Power Containers and ancillary equipment for WSMR. - Executed Defense Ordnance Technology Consortium (DOTC) initiative for Pulsed Current Transfer to advance slip ring technology for tactical system. - Executed engineering tasks to reduce SWAP-C of the Pulsed Power System. - Commission a Railgun Integration Test Site in White Sands, New Mexico able to conduct close-loop fire control testing on a controlled range with an HVP fired from a Railgun. The Railgun at WSMR will be fired from a non-articulated test stand fixture. - Continue railgun system-level management, engineering development, integration, and testing of the Railgun. ***FY 2018 Base Plans:*** - Complete acceptance of remaining equipment and support ONR Railgun INP operations. ***FY 2018 OCO Plans:*** N/A.					
Accomplishments/Planned Programs Subtotals	31.980	23.776	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Tech maturation and system development efforts will be competitive in nature and are currently focused on establishing the technical requirements for the next round of competition prior to entering the Engineering & Manufacturing Development (E&MD) phase. The focus of the current efforts under cognizance of this PE are to ensure there are a sufficient quantity of qualified vendors at the critical component and system level to ensure a robust competitive environment at Milestone B. This effort is outside the scope of ONR efforts, which are focused on the development of component technologies and demonstration of repetitive firings at a tactical rate.

E. Performance Metrics

- Complete EMRG Design Review

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 3370 / *Railgun*

- Conduct EMRG Test Events and Test Artifacts Review
- Conduct EMRG Test Plan Review
- Conduct EMRG System Testing & Analysis Review

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603925N / *Directed Energy and Electric Weapon System*	Project (Number/Name) 3402 / *Surface Navy Laser Weapon System (SNLWS)*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3402: *Surface Navy Laser Weapon System (SNLWS)*	0.000	0.000	0.000	63.281	-	63.281	83.807	60.221	45.942	30.062	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Surface Navy Laser Weapon System (SNLWS) funding is requested for the expedited development and fielding of the SNLWS system to Naval Forces. SNLWS will include the development of an advanced prototype laser weapon system 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 Low Power Module (LPM), 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 increase from FY17 to FY18 reflects the establishment of Surface Navy Laser Weapon System (SNLWS) prototype development efforts.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: SNLWS Development	0.000	0.000	36.104	0.000	36.104
Articles:	-	-	-	-	-
FY 2016 Accomplishments: N/A.					
FY 2017 Plans: N/A.					
FY 2018 Base Plans: - 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. - 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. - Conduct System Requirements Review					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 3402 / *Surface Navy Laser Weapon System (SNLWS)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Conduct System Functional Review. - Develop Preliminary Design Data/Package. - Conduct Preliminary Design Review. - Initiate development of Interface Functional Descriptions (IFDs) for the appropriate combat system baseline. - Conduct SNLWS Technical Interchange Meetings (TIMs) with PEO IWS and designated field activities. - Provide programmatic and engineering support to SNLWS Integrated Product Teams (IPTs) and Working Groups (WGs). - Initiate procurement of long lead items as applicable: Mount, Lasers, Computer Systems, Cables/Connectors, Beam Director, Optics/Bench, Mirrors, Cameras/Illuminators, Laser Structure/Foundation, Power/Cooling Mod Kits, and Platform Mod Kits. - Develop and deliver required contract cost, schedule and performance related documentation. ***FY 2018 OCO Plans:*** N/A.					
Title: SNLWS Government and Support Engineering Services ***Articles:*** ***FY 2016 Accomplishments:*** N/A. ***FY 2017 Plans:*** N/A. ***FY 2018 Base Plans:*** - Review proposals and Conduct SNLWS Source Selection. - Develop and award SNLWS contract. - Support System Requirements Review conducted by the prime contractor. - Support System Functional Review conducted by the prime contractor. - Support Preliminary Design Review (PDR) efforts leading up to the formal PDR. - Initiate AEGIS Combat System software and integration planning, trade studies and engineering. - Initiate DDG 51 Flight IIA Ship Integration & Installation requirements, trade studies and engineering. - Provide engineering support of the contractor development of Interface Functional Descriptions (IFDs) for the appropriate combat system baseline. - Initiate test planning and procedure development to ensure traceability to system requirements to support future system testing.	0.000 -	0.000 -	27.177 -	0.000 -	27.177 -

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 3402 / *Surface Navy Laser Weapon System (SNLWS)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Initiate hardware/software development/build of Laser Weapon Control System (LWCS) to be provided as government furnished equipment (GFE). - Initiate development/build of the De-confliction Safety System (DSS) to be provided as GFE. - Support SNLWS Technical Interchange Meetings (TIMs). - Support SNLWS Integrated Product Teams (IPTs) and Working Groups (WGs). - Develop programmatic and technical documentation to support the Rapid Prototyping, Experimentation, and Demonstration (RPED) initiative. ***FY 2018 OCO Plans:*** N/A.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	63.281	0.000	63.281

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 GFE to Vendor.
- Conduct Preliminary Design Review.
- Conduct Final Design Review.
- Develop/deliver De-confliction Safety System GFE to Vendor.
- Conduct Production Readiness Review.
- Conduct T&E review for Contractor Test.
- Conduct Contractor Test.
- Deliver Test Unit.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 3402 / *Surface Navy Laser Weapon System (SNLWS)*

- Install, Develop, Test & Operate delivered system.
- Sustain delivered system.
- Initiate Combat System Integration & DDG 51 Flight IIA Integration/Installation Engineering.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603925N / *Directed Energy and Electric Weapon System*	Project (Number/Name) 3402 / *Surface Navy Laser Weapon System (SNLWS)*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SNLWS Development	C/CPFF	Contractor TBD : TBD	0.000	0.000		0.000		36.104	Apr 2018	-		36.104	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		36.104		-		36.104	-	-	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 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		0.000		14.425	Dec 2017	-		14.425	Continuing	Continuing	Continuing
SNLWS Ship Installation Documentation	C/CPFF	BIW : Bath, ME	0.000	0.000		0.000		1.171	Feb 2018	-		1.171	Continuing	Continuing	Continuing
SNLWS Combat System Integration	C/CPFF	Lockheed Martin : Moorestown, NJ	0.000	0.000		0.000		2.813	Feb 2018	-		2.813	Continuing	Continuing	Continuing
SNLWS Systems Engineering	WR	NSWC Crane : Crane, IN	0.000	0.000		0.000		1.386	Dec 2017	-		1.386	0.000	1.386	-
SNLWS Systems Engineering	WR	NSWC PHD : Port Hueneme, CA	0.000	0.000		0.000		0.881	Dec 2017	-		0.881	0.000	0.881	-
SNLWS Systems Engineering	WR	SSC PAC : San Diego, CA	0.000	0.000		0.000		0.628	Dec 2017	-		0.628	0.000	0.628	-
SNLWS Systems Engineering	WR	NPS : Monetrey, CA	0.000	0.000		0.000		0.628	Dec 2017	-		0.628	0.000	0.628	-
SNLWS Systems Engineering	MIPR	MIT LL : Lexington, MA	0.000	0.000		0.000		0.628	Dec 2017	-		0.628	0.000	0.628	-
SNLWS Systems Engineering	C/CPFF	PSU EOC : Freeport, PA	0.000	0.000		0.000		1.131	Dec 2017	-		1.131	0.000	1.131	-
		Subtotal	0.000	0.000		0.000		23.691		-		23.691	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603925N / *Directed Energy and Electric Weapon System*	Project (Number/Name) 3402 / *Surface Navy Laser Weapon System (SNLWS)*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SNLWS Test & Evaluation	WR	NSWC PHD : Port Hueneme, CA	0.000	0.000		0.000		0.493	Dec 2017	-		0.493	Continuing	Continuing	Continuing
SNLWS Test & Evaluation	WR	NSWC Crane : Crane, IN	0.000	0.000		0.000		0.500	Dec 2017	-		0.500	0.000	0.500	-
SNLWS Test & Evaluation	WR	NSWC Dahlgren : Dahlgren, VA	0.000	0.000		0.000		0.500	Dec 2017	-		0.500	0.000	0.500	-
		Subtotal	0.000	0.000		0.000		1.493		-		1.493	-	-	-

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 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		0.000		0.843	Dec 2017	-		0.843	0.000	0.843	-
SNLWS Program Management/Engineering Support	C/CPFF	SPA : Washington, D.C.	0.000	0.000		0.000		1.000	Dec 2017	-		1.000	Continuing	Continuing	Continuing
SNLWS Travel	Various	NAVSEA : Washington, D.C.	0.000	0.000		0.000		0.150	Sep 2018	-		0.150	0.000	0.150	-
		Subtotal	0.000	0.000		0.000		1.993		-		1.993	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		0.000		63.281		-		63.281	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 3402 / *Surface Navy Laser Weapon System (SNLWS)*

SNLWS

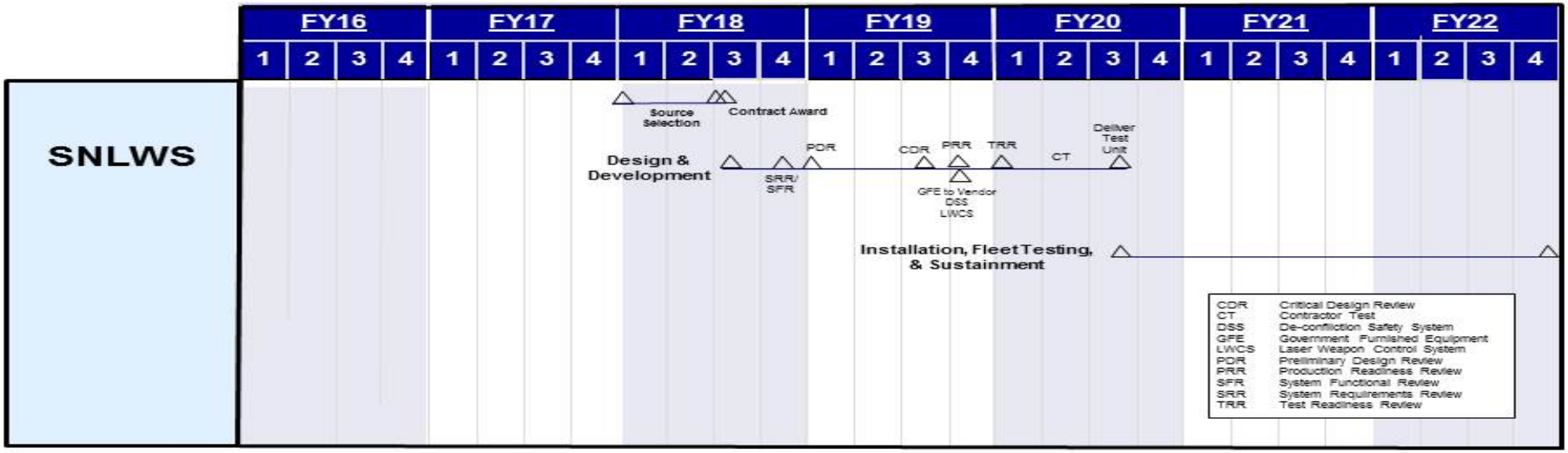

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 3402 / *Surface Navy Laser Weapon System (SNLWS)*

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	3	2018	4	2018
SNLWS: Preliminary Design Review	1	2019	1	2019
SNLWS: Critical Design Review	3	2019	3	2019
SNLWS: Laser Weapon Control System GFE to Vendor	4	2019	4	2019
SNLWS: Deconfliction Safety System GFE to Vendor	4	2019	4	2019
SNLWS: Production Readiness Review	4	2019	4	2019
SNLWS: Test Readiness Review	1	2020	1	2020
SNLWS: Contractor Test	1	2020	3	2020
SNLWS: Deliver Test Unit	3	2020	3	2020
SNLWS: Installation, Fleet Testing & Sustainment	3	2020	4	2022

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603925N / *Directed Energy and Electric Weapon System*	Project (Number/Name) 9823 / *Lasers for Navy applicat*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
9823: *Lasers for Navy applicat*	12.804	9.375	8.924	44.029	-	44.029	34.100	18.400	2.100	2.140	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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. 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, procurement of long lead material, assembly and checkout, system certification, and platform integration/installation.

The increased funding in FY 2018 reflects a change in project direction from a single module attached to the Office of Naval Research's SSL Technical Maturation (SSL-TM) efforts to the design and procurement of eight standalone units for deployment on DDG 51 surface combatants. The increased funding is for the non-recurring 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Solid State Laser (SSL) Low Power Module (LPM) Development	9.375	8.924	44.029	0.000	44.029
Articles:	-	-	-	-	-
FY 2016 Accomplishments:					
- Continued LPM management, engineering, design, development.					
- Conducted rigorous outdoor testing to validate software models using the design reference wavelengths.					
- Conducted initial and final design reviews.					
- Initiated procurement of test bed components.					
- Conducted subsystem testing of components.					
- Initiated LPM Test Plan.					
- Initiated development of the LPM Weapon System Specification Update.					
- Initiated development of the LPM System Requirements Document.					
- Initiated development of the LPM Sub-System Requirements Document.					
- Initiated procurement of a Hybrid Predictive Avoidance Safety System.					
- Initiated LPM Technical Design Concepts & Reviews.					
- Initiated LPM Trade Studies & Analyses.					
- Initiated LPM Analysis of available Space, Weight, Power & Cooling (SWAP-C) onboard a DDG 51 Flight IIA Class Ship.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 9823 / *Lasers for Navy applicat*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Planned for integrated testing in FY 17. ***FY 2017 Plans:*** - Continue LPM management, engineering, design, development, procurement and integration of test bed components. - Develop System Requirements Document (SRD) for Stand Alone System. - Develop Concept of Operations Document (CONOPS) for Stand Alone System. - Perform Top Level Design of a Stand Alone Systems. - Design and procure Stand Alone Gimbal. - Conduct LPM Prototype Testing/Analysis. - Conduct LPM Subsystem Integration & Testing. ***FY 2018 Base Plans:*** - Complete System Engineering of initial LPM design and initiate the detailed design of a Stand Alone System to include the train and elevation capability, pointing/tracking mount and associated hardware/software, and additional beam control software required for a stand alone capability - Conduct Technical Design Reviews - Procure/integrate additional sensor components, i.e., track illumination laser and Battle Damage Assessment laser, required for Stand Alone System - Conduct non-recurring engineering, design, and documentation for shipboard integration and installation on DDG 51 class ships - Perform Assembly and Checkout of first two units. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	9.375	8.924	44.029	0.000	44.029

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.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 9823 / *Lasers for Navy applicat*

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

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 9823 / *Lasers for Navy applicat*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
LPM Development	WR	NSWC DD : Dahlgren, VA	2.702	2.138	Apr 2016	1.680	Feb 2017	0.000		-		0.000	Continuing	Continuing	Continuing
LPM Development	WR	SSC PAC : San Diego, CA	1.058	0.030	Mar 2016	0.400	Feb 2017	0.000		-		0.000	Continuing	Continuing	Continuing
LPM Development	WR	NSWC CRANE : Crane, IN	0.980	0.540	Mar 2016	0.625	Feb 2017	0.000		-		0.000	Continuing	Continuing	Continuing
LPM Development	WR	NRL : Washington, D.C.	0.195	0.275	Dec 2015	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	1.227	1.500	Mar 2016	0.952	May 2017	0.000		-		0.000	Continuing	Continuing	Continuing
Testbed	C/CPFF	PSU EOC : Freeport, PA	0.500	0.500	Mar 2016	0.540	Mar 2017	0.000		-		0.000	Continuing	Continuing	Continuing
Platform Integration	WR	NSWC DD : Dahlgren, VA	0.222	0.297	Mar 2016	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Platform Integration	WR	SSC PAC : San Diego, CA	0.000	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Platform Integration	WR	NSWC CRANE : Crane, IN	0.000	0.000		0.000		0.000		-		0.000	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	0.000	0.012	Sep 2016	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Hardware & Software - Material Buys	C/FFP	NSWC DD : Dahlgren, VA	0.000	0.000		0.000		25.407	Jan 2018	-		25.407	Continuing	Continuing	Continuing
Engineering/Development	WR	NSWC DD : Dahlgren, VA	0.000	0.000		0.255	May 2017	2.748	Dec 2017	-		2.748	Continuing	Continuing	Continuing
Software Development	WR	NSWC DD : Dahlgren, VA	0.000	0.000		0.000		1.976	Dec 2017	-		1.976	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603925N / *Directed Energy and Electric Weapon System*	Project (Number/Name) 9823 / *Lasers for Navy applicat*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering/Development	WR	NSWC PHD : Port Hueneme, CA	0.000	0.000		0.435	May 2017	0.000		-		0.000	0.000	0.435	-
		Subtotal	8.473	5.292		4.887		30.131		-		30.131	-	-	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems/Mgmt Engineering	WR	NSWC DD : Dahlgren, VA	0.100	0.150	Dec 2015	0.280	May 2017	0.000		-		0.000	Continuing	Continuing	Continuing
Systems/Mgmt Engineering	C/CPFF	PSU EOC : Freeport, PA	0.907	0.817	Mar 2016	0.727	May 2017	0.000		-		0.000	Continuing	Continuing	Continuing
Modeling & Simulation	WR	NSWC DD : Dahlgren, VA	0.249	0.150	Mar 2016	0.160	May 2017	0.000		-		0.000	Continuing	Continuing	Continuing
Systems/Mgmt Engineering	WR	PATUXENT PARTNERSHIP : Lexington Park, MD	0.000	0.202	May 2016	0.220	Apr 2017	0.000		-		0.000	Continuing	Continuing	Continuing
Systems/Mgmt Engineering	C/CPFF	CSC : Washington, D.C.	0.000	0.080	May 2016	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Platform Integration	WR	NSWC DD : Dahlgren, VA	0.000	0.000		0.448	May 2017	7.858	Jan 2018	-		7.858	Continuing	Continuing	Continuing
Platform Intgegration	WR	NSWC CRANE : Crane, IN	0.000	0.000		0.060	Feb 2017	0.250	Dec 2017	-		0.250	Continuing	Continuing	Continuing
Platform Integration	WR	SPAWAR : San Diego, CA	0.000	0.000		0.112	May 2017	0.150	Dec 2017	-		0.150	Continuing	Continuing	Continuing
Platform Integration	C/FFP	PSU EOC : Freeport, PA	0.000	0.000		0.000		0.350	Jan 2018	-		0.350	Continuing	Continuing	Continuing
Spares	WR	NSWC DD : Dahlgren, VA	0.000	0.000		0.000		0.654	Dec 2017	-		0.654	Continuing	Continuing	Continuing
Packaging, Handling, Storage & Transportation	WR	NSWC DD : Dahlgren, VA	0.000	0.000		0.000		0.088	Dec 2017	-		0.088	Continuing	Continuing	Continuing
		Subtotal	1.256	1.399		2.007		9.350		-		9.350	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 9823 / *Lasers for Navy applicat*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test Planning & Execution	C/CPFF	NSWC DAHGREN : Dahlgren, VA	0.000	0.320	Apr 2016	0.100	May 2017	0.000		-		0.000	Continuing	Continuing	Continuing
Test Planning & Execution	WR	PHD NSWC : Port Hueneme, CA	0.180	0.275	Jan 2016	0.150	May 2017	1.062	Dec 2017	-		1.062	Continuing	Continuing	Continuing
Test Planning & Execution	WR	NSWC DD : Dahlgren, VA	0.250	0.777	May 2016	0.100	May 2017	1.063	Dec 2017	-		1.063	Continuing	Continuing	Continuing
Test Planning & Execution	WR	NSWC CRANE : Crane, IN	0.214	0.078	Feb 2016	0.015	Feb 2017	0.000		-		0.000	Continuing	Continuing	Continuing
Test Planning & Execution	MIPR	KIRTLAND AFT : Albuquerque, NM	0.000	0.045	Nov 2016	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Test Planning & Execution	WR	SSC PAC : San Diego, CA	0.000	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	0.644	1.495		0.365		2.125		-		2.125	-	-	-

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Safety, Product Support, Security, Operations	WR	NSWC DD : Dahlgren, VA	1.609	0.905	Mar 2016	0.788	May 2017	1.862	Dec 2017	-		1.862	Continuing	Continuing	Continuing
Program Mgmt/Support	C/CPFF	GRYPHON Technologies : Washington, D.C.	0.000	0.178	Sep 2016	0.320	May 2017	0.250	Jan 2018	-		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
Safety, Product Support, Security, Operations	WR	NAVFACENG : San Diego, CA	0.000	0.030	Sep 2016	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
SBIR Withhold	C/FFP	TBD : TBD	0.000	0.024	Sep 2017	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Travel	Various	NAVSEA : Washington, D.C.	0.000	0.052	Sep 2017	0.052	Sep 2017	0.076	Sep 2018	-		0.076	Continuing	Continuing	Continuing
Program Mgmt/Support	C/CPFF	SPA : Washington, D.C.	0.000	0.000		0.355	May 2017	0.235	Jan 2018	-		0.235	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603925N / *Directed Energy and Electric Weapon System*	Project (Number/Name) 9823 / *Lasers for Navy applicat*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Mgmt/Support	C/CPFF	TMB : Washington, D.C.	0.000	0.000		0.150	May 2017	0.000		-		0.000	0.000	0.150	-
		Subtotal	2.431	1.189		1.665		2.423		-		2.423	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	12.804	9.375		8.924		44.029		-		44.029	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 9823 / *Lasers for Navy applicat*

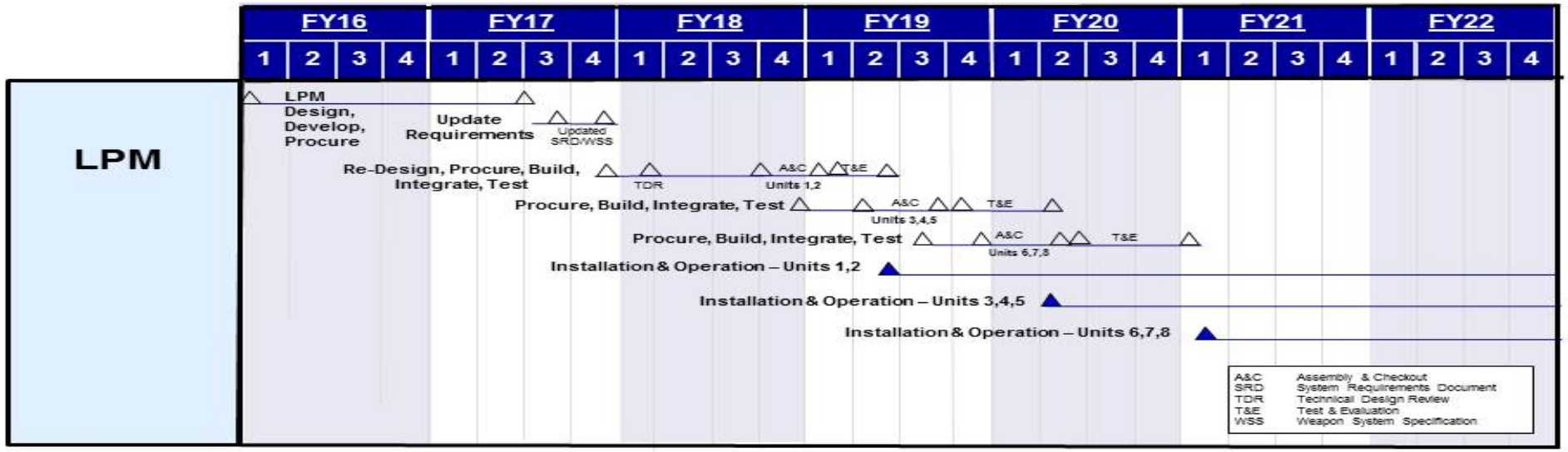

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 9823 / *Lasers for Navy applicat*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 9823				
Engineering	1	2016	1	2019
Design	1	2016	1	2016
Initial Design Review	1	2016	1	2016
Final Design	1	2016	3	2016
Prototype Module Development/Procurement	1	2016	3	2017
Test Plan Development	1	2016	1	2017
Final Design Review	3	2016	3	2016
Prototype Module Testing/Analysis	4	2016	3	2017
Subsystem Integration & Testing	1	2017	1	2017
SSL Integration/Testing	1	2017	3	2017
Update Systems Requirements Document (SRD)	3	2017	4	2017
Update Weapon System Spec (WSS)	3	2017	4	2017
Redesign, Procure, Build, Integrate, Test (Unit's 1 & 2)	4	2017	2	2019
Technical Design Review (Unit's 1 & 2)	1	2018	1	2018
Assembly & Checkout (Unit's 1 & 2)	3	2018	1	2019
Procure, Build, Integrate, Test (Unit's 3, 4, 5)	4	2018	2	2020
Test & Evaluation (Unit's 1 & 2)	1	2019	2	2019
Assembly & Checkout (Unit's 3, 4, 5)	2	2019	3	2019
Testing/Analysis and final report	2	2019	4	2019
Installation & Operation (Unit's 1 & 2)	2	2019	4	2022
Procure, Build, Integrate, Test (Unit's 6, 7, 8)	3	2019	2	2020

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 9823 / *Lasers for Navy applicat*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Assembly & Checkout (Unit's 6, 7, 8)	4	2019	4	2019
Test & Evaluation (Unit's 3, 4, 5)	4	2019	2	2020
Instalation & Operation (Unit's 3, 4, 5)	2	2020	4	2022
Test & Evaluation (Unit's 6, 7, 8)	2	2020	1	2021
Installation & Operation (Unit's 6, 7,8)	1	2021	4	2022

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604112N *I (U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	51.527	95.408	70.528	83.935	-	83.935	84.195	57.668	27.503	28.009	Continuing	Continuing
2208: *CVN 21*	40.211	34.938	32.843	57.946	-	57.946	68.152	57.668	27.503	28.009	Continuing	Continuing
4004: *EMALS*	11.316	12.195	37.685	25.989	-	25.989	16.043	0.000	0.000	0.000	0.000	103.228
9999: *Congressional Adds*	0.000	48.275	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	48.275

Program MDAP/MAIS Code:
Project MDAP/MAIS Code(s): 223

A. Mission Description and Budget Item Justification

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.

- (C275) - Planning for the Full Ship Shock Trial for the USS Gerald Ford (CVN 78) in accordance with the Acquisition
Decision Memorandum (ADM) dated 7 August 2015.

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: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604112N *I (U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	98.105	70.528	96.339	-	96.339
Current President's Budget	95.408	70.528	83.935	-	83.935
Total Adjustments	-2.697	0.000	-12.404	-	-12.404
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-2.697	0.000			
• Program Adjustments	0.000	0.000	-13.175	-	-13.175
• Rate/Misc Adjustments	0.000	0.000	0.771	-	0.771

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2016	FY 2017
Project: 9999: *Congressional Adds*		
Congressional Add: *CVN-78 Shock Trials*	48.275	0.000
Congressional Add Subtotals for Project: 9999	48.275	0.000
Congressional Add Totals for all Projects	48.275	0.000

Change Summary Explanation

2208 - FY 18 Operational Test & Evaluation funding reduced by $13.175 due to schedule shift in IOT&E and OT-C1 to 1Q 2021

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	Project (Number/Name) 2208 / *CVN 21*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2208: *CVN 21*	40.211	34.938	32.843	57.946	-	57.946	68.152	57.668	27.503	28.009	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: CVN 78 Class Advanced Technology Design & Development	23.505	7.455	31.374	0.000	31.374
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 2016 Accomplishments: Continued transition of key technologies to support CVN 21 (CVN 78 Class) KPPs. Continued design activities to integrate new technologies into the ship. Continued to assess ship impacts and implemented changes to the Class design. Continued existing studies and commenced new studies required for integrated warfare system and C4I design, integration, test, and validation efforts. Continued review of Pre-Planned Product Improvement					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	**Project (Number/Name)** 2208 / *CVN 21*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
(P3I) technical data packages. Continued CVN 78 Class engineering and technical support of aircraft launch and recovery systems. Continued shipbuilder system and cost engineering support to assess ship impacts from selected ECRs and changes to the GFE / CFE equipment split. Planned and executed the acceptance and transition of CVN 78 CFE systems to Navy In-Service and Life Cycle Management. Identified and implemented cost reduction measures for the CVN 78 Class.					
FY 2017 Plans: Complete design activities to integrate new technologies into the ship. Complete existing studies required for integrated warfare system and C4I design, integration, test, and validation efforts. Continue CVN 78 class engineering and technical support of aircraft launch and recovery systems, along with providing support to resolve issues identified during shakedown and Post-Shakedown Availability (PSA) on CVN 78 developmental systems. Conduct cyber-security tasks to include elimination of all Windows XP operating system usage to reduce cyber-security vulnerabilities and the completion of Information Technology system Interim Authority to Operate (IATO) remedial actions in order to achieve full Authority to Operate (ATO) certification and accreditation.					
FY 2018 Base Plans: 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. 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 and complete prerequisite testing for the CVN 78 Class FSST on CVN 78. The increase from FY2017 to FY2018 is due to the requirement for component shock qualification testing. Raytheon will be performing shock qualification testing of Dual Band Radar (DBR). NSWC Philadelphia will have an increased workload 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 Enterprise Services (CANES) Video, Radio Communication System (RCS), Automated Digital Network System (ADNS), and Communications Data Link					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	**Project (Number/Name)** 2208 / *CVN 21*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
System (CDLS). There are also increasing requirements from Integrated Warfare Systems that are required for Ship's Self Defense System (SSDS) and Guided Missile Launching System (GMLS) for qualification. ***FY 2018 OCO Plans:*** N/A					
Title: CVN 21 - Test & Evaluation (T&E)	11.433	25.388	26.572	0.000	26.572
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Updated the Test and Evaluation Master Plan (TEMP) 1610, Revision C. Continued holding the tri-annual Post Delivery Tests and Trials (PDT&T) workshops and updating / maintaining the notional PDT&T schedule. Continued the Developmental Test Working Group (DTWG) efforts, focusing on the collection / analysis of the Developmental Test (DT) metrics. Continued CVN 78 Integrated Test Team (CITT) efforts to coordinate Integrated Testing (IT) to achieve synergies among DT&E, OT&E, and LFT&E. Continued Developmental Test / Integrated Test Phase 4 (DT/IT-4). Completed Operational Test Phase B4 (OT-B4). ***FY 2017 Plans:*** Continue PDT&T, DTWG and CITT planning efforts in support of DT/IT-4 completion and post-PSA DT/IT-5 integration testing and preparations for Initial Operational Test and Evaluation (IOT&E). DT/IT-4 test events include: (1) Combat Systems Shipboard Developmental Testing (CS SBDT); (2) cyber-security inspections and aircraft compatibility testing; (3) Special Performance Trials and Acoustic Trials; and (4) continuing development of the Sea-strike Sea-basing Aviation Model (SSAM) and data collection in support of model validation. DT/IT-5 events include: (1) obtaining post-PSA Platform (Afloat Site) 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) Combat System Ship Qualification Trial (CSSQT). ***FY 2018 Base Plans:*** Continue PDT&T, DTWG and CITT efforts in support of DT/IT-4 completion. Perform oversight of FY 18 PDT&T and DT/IT-4 test event integration to address DT and OT requirements. Major FY 18 PDT&T and DT/IT-4 test events include: (1) continued 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 SSAM and data collection in support of model validation.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	**Project (Number/Name)** 2208 / *CVN 21*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Continue PDT&T, DTWG, and CITT planning efforts in support of post-PSA DT/IT-5 integration testing and preparations for IOT&E. Major post-PSA DT/IT-5 test events include: (1) obtaining post-PSA Platform (Afloat Site) 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 CSSQT. Continue planning for a CVN 78 Full Ship Shock Trial (FSST) to be conducted in FY19. Continue developing the CVN 78 FSST Plan. Continue the Modeling & Simulation (M&S) effort supporting the CVN 78 FSST pre-trial predictions. Continue planning to mitigate potential environmental impacts. Begin working with support activities to coordinate transport and storage of explosive charges. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	34.938	32.843	57.946	0.000	57.946

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• RDTEN / 0604567N: *Project Units 3108, 3179, 4007*	18.151	50.920	54.131	-	54.131	51.235	47.338	46.024	46.918	Continuing	Continuing
• SCN / 2001: *Carrier Replacement Program*	2,431.929	2,662.567	4,461.772	-	4,461.772	1,576.966	2,234.571	2,966.013	2,351.884	2,326.440	38,479.270
• SCN / 5300: *Completion of Prior Year Shipbuilding Programs*	123.760	0.000	20.000	-	20.000	0.000	0.000	0.000	0.000	0.000	1,394.860
• OMN / 1B2B: *CVN 78 Ford Class Training and Sustainment (12BJ0)*	25.534	14.111	14.099	-	14.099	9.422	8.398	6.580	7.165	Continuing	Continuing
• OPN / 5664: *Surface Training Equipment*	0.000	4.733	12.010	-	12.010	8.039	1.006	5.034	3.024	0.000	33.846
• OMN / 1B1B: *Mission and Other Ship Operations (11B20)*	0.000	21.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	21.000

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	**Project (Number/Name)** 2208 / *CVN 21*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost

Remarks

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.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	**Project (Number/Name)** 2208 / *CVN 21*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Advanced Design & Development	C/CPAF	HII : VA	2.128	0.617	Nov 2015	1.821	Nov 2016	2.825	Nov 2017	-		2.825	Continuing	Continuing	Continuing
Advanced Design & Development	WR	NSWC CARDEROCK : MD	1.837	1.046	Oct 2015	1.109	Oct 2016	0.000		-		0.000	Continuing	Continuing	Continuing
Advanced Design & Development	WR	NAWC PATUXENT RIVER : MD	1.894	1.999	Oct 2015	1.188	Oct 2016	0.000		-		0.000	Continuing	Continuing	Continuing
Advanced Design & Development	WR	NSWC DAHLGREN : VA	2.732	1.520	Oct 2015	0.515	Nov 2016	0.000		-		0.000	Continuing	Continuing	Continuing
Advanced Design & Development	C/CPAF	RAYTHEON : VA	4.814	3.239	Oct 2015	1.188	Dec 2016	10.100	Nov 2017	-		10.100	Continuing	Continuing	Continuing
Advanced Design & Development	C/CPFF	NAVSEA SEAPORT : DC	5.315	7.849	Dec 2015	1.386	Dec 2016	0.000		-		0.000	Continuing	Continuing	Continuing
Advanced Design & Development	Various	MISCELLANEOUS : VARIOUS	0.924	2.716	Oct 2015	0.248	Nov 2016	7.538	Nov 2017	-		7.538	Continuing	Continuing	Continuing
Advanced Design & Development	WR	NSWC PHILADELPHIA : PA	5.928	3.591	Nov 2015	0.000		4.543	Nov 2017	-		4.543	Continuing	Continuing	Continuing
Advanced Design & Development	WR	SPAWAR : CA	0.619	0.559	Oct 2015	0.000		6.368	Nov 2017	-		6.368	Continuing	Continuing	Continuing
Advanced Design & Development	WR	NSWC CORONA : CA	0.820	0.369	Nov 2015	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	32.215	23.505		7.455		31.374		-		31.374	-	-	-

Remarks

The increase from FY2017 to FY2018 is due to the requirement for component shock qualification testing.
-Raytheon will be performing shock qualification testing of Dual Band Radar (DBR).
-NSWC Philadelphia will have an increased workload 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 Enterprise Services (CANES) Video, Radio Communication System (RCS), Automated Digital Network System (ADNS), and Communications Data Link System (CDLS). There are also increasing requirements from Integrated Warfare Systems that are required for Ship's Self Defense System (SSDS) and Guided Missile Launching System (GMLS) for qualification.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	Project (Number/Name) 2208 / *CVN 21*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Test & Evaluation	C/CPAF	HII : VA	2.197	0.559	Nov 2015	0.842	Nov 2016	1.338	Nov 2017	-		1.338	Continuing	Continuing	Continuing
Development Test & Evaluation	WR	NAWC PATUXENT RIVER : MD	1.064	0.678	Nov 2015	3.878	Oct 2016	1.576	Nov 2017	-		1.576	Continuing	Continuing	Continuing
Development Test & Evaluation	WR	NSWC DAHLGREN : VA	2.431	3.115	Oct 2015	3.911	Oct 2016	5.034	Nov 2017	-		5.034	Continuing	Continuing	Continuing
Development Test & Evaluation	WR	NSWC CARDEROCK : MD	0.000	0.176	May 2016	0.597	Oct 2016	6.048	Nov 2017	-		6.048	Continuing	Continuing	Continuing
Development Test & Evaluation	WR	SPAWAR : CA	0.000	0.120	Dec 2015	0.696	Nov 2016	0.000		-		0.000	Continuing	Continuing	Continuing
Development Test & Evaluation	C/CPAF	RAYTHEON : VA	0.525	1.533	Jan 2016	1.716	Dec 2016	1.475	Dec 2017	-		1.475	Continuing	Continuing	Continuing
Development Test & Evaluation	WR	SSC ATLANTIC : SC	0.025	0.000		0.832	Nov 2016	0.000		-		0.000	Continuing	Continuing	Continuing
Development Test & Evaluation	Various	MISCELLANEOUS : VARIOUS	0.045	0.056	Oct 2015	0.346	Dec 2016	4.681	Dec 2017	-		4.681	Continuing	Continuing	Continuing
Development Test & Evaluation	C/CPFF	NAVSEA SEAPORT : DC	0.255	0.361	Jan 2016	0.000		1.100	Nov 2017	-		1.100	Continuing	Continuing	Continuing
Development Test & Evaluation	C/BA	NSWC PORT HUENEME : CA	0.000	0.182	Dec 2015	0.590	Dec 2016	0.000		-		0.000	Continuing	Continuing	Continuing
Development Test & Evaluation	C/BA	NSWC CORONA : CA	0.000	0.182	Oct 2015	1.436	Dec 2016	0.000		-		0.000	Continuing	Continuing	Continuing
Development Test & Evaluation	WR	NAWC LAKEHURST : NJ	0.000	1.143	Nov 2015	0.000		1.680	Nov 2017	-		1.680	Continuing	Continuing	Continuing
Development Test & Evaluation	WR	NSWC PHILADELPHIA : PA	0.000	0.000		0.000		1.200	Nov 2017	-		1.200	Continuing	Continuing	Continuing
Operational Test & Evaluation	WR	COMOPTEVFOR : VA	1.454	3.190	Nov 2015	10.544	Dec 2016	2.440	Nov 2017	-		2.440	Continuing	Continuing	Continuing
Operational Test & Evaluation	WR	NAWC PATUXENT RIVER : MD	0.000	0.138	Feb 2016	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	7.996	11.433		25.388		26.572		-		26.572	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	Project (Number/Name) 2208 / *CVN 21*	

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	40.211	34.938		32.843		57.946		-		57.946	-	-	-

Remarks

Exhibit R-4, **RDT&E Schedule Profile:** FY 2018 Navy		**Date:** May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	**Project (Number/Name)** 2208 / *CVN 21*

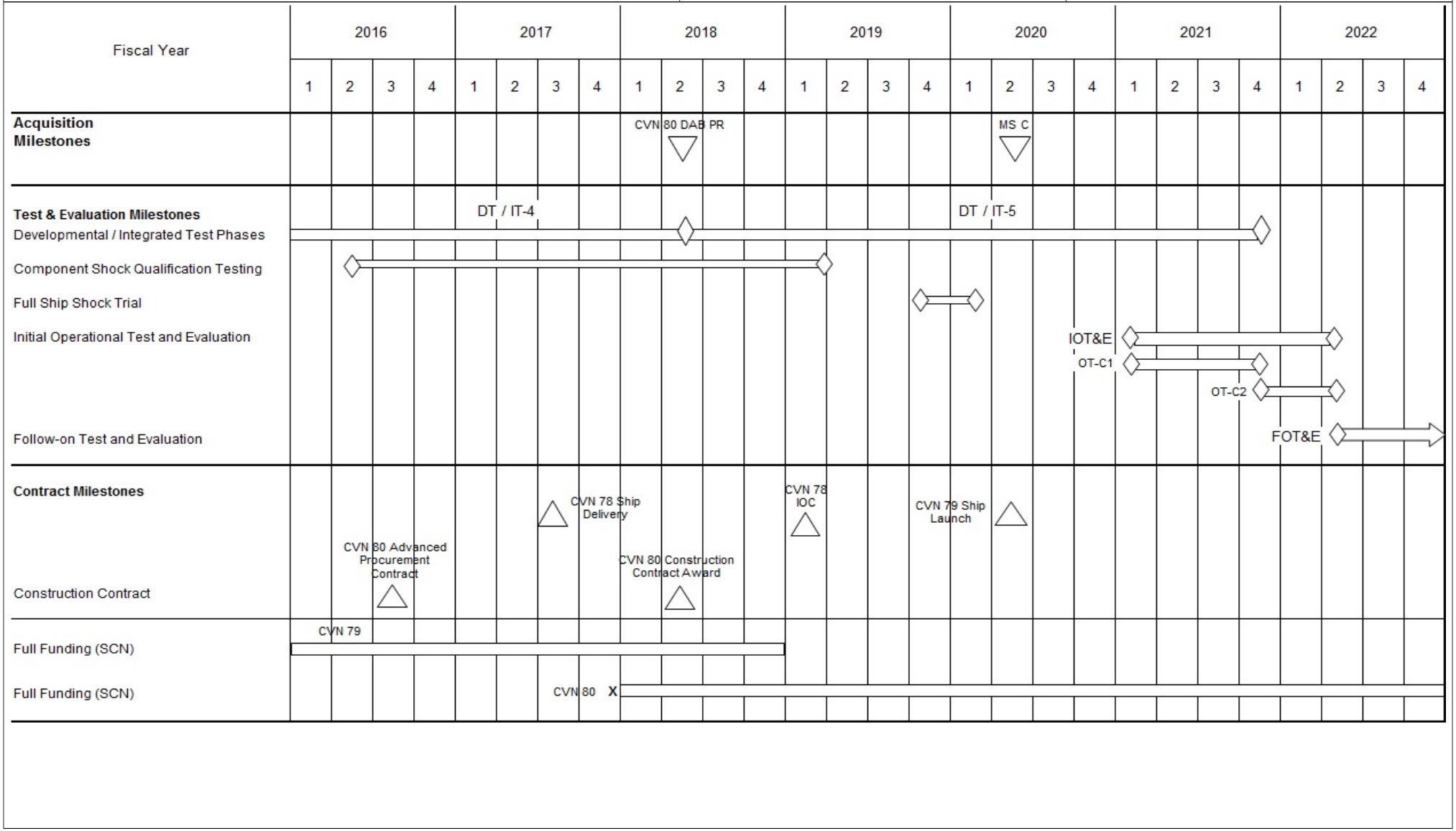

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	**Project (Number/Name)** 2208 / *CVN 21*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2208				
CVN 80 DAB PR	2	2018	2	2018
Milestone C	2	2020	2	2020
DT/IT -4- Developmental Test / Integrated Test Phase 4	1	2016	2	2018
DT/IT -5- Developmental Test / Integrated Test Phase 5	2	2018	4	2021
Component Shock Qualification Testing	2	2016	1	2019
Full Ship Shock Trial	4	2019	1	2020
Initial Operational Test & Evaluation	1	2021	2	2022
OT -C1 - Initial Operational Test & Evaluation - Phase C1	1	2021	4	2021
OT -C2 - Initial Operational Test & Evaluation - Phase C2	4	2021	2	2022
FOT&E - Follow-On Test & Evaluation	2	2022	4	2022
CVN 78 Ship Delivery	3	2017	3	2017
CVN 78 Initial Operational Capability (IOC)	1	2019	1	2019
CVN 80 Advanced Procurement Contract Award	3	2016	3	2016
CVN 80 Construction Contract Award	2	2018	2	2018
CVN 79 SCN Full Funding	1	2016	4	2018
CVN 79 Ship Launch	2	2020	2	2020
CVN 80 SCN Full Funding	1	2018	4	2022

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	Project (Number/Name) 4004 / *EMALS*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
4004: *EMALS*	11.316	12.195	37.685	25.989	-	25.989	16.043	0.000	0.000	0.000	0.000	103.228
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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: EMALS	12.195	37.685	25.989	0.000	25.989
Articles:	-	-	-	-	-
Description: EMALS					
FY 2016 Accomplishments: (1) EMALS BOA ILS Order - Continued the execution of the EMALS ILS Development Program. Conducted annual logistics reviews, training IPR and O & I level Interactive Electronic Technical Manual (IETM) final system level IPR. Delivered the final EMALS O & I level IETM. Procured and delivered remaining quantity of Portable Electronic Maintenance Aids (PEMAs) to the CVN 78 for IETM use. Completed the Reliability Centered Maintenance (RCM) process and the development of Maintenance Requirement Cards (MRCs) and Quality Assurance (QA) cards. (2) EMALS BOA Integrated Test & Evaluation (IT&E) Order - Maintained EMALS shore-based test site to support engineering investigations, software integration, deficiency resolution, component obsolescence, and cyber security vulnerability. Conducted EMALS 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. Conducted Environmental Qualification Testing (EQT) for Launch Control Subsystem (LCS) components deferred from					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	**Project (Number/Name)** 4004 / *EMALS*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
SDD. ***FY 2017 Plans:*** Conduct 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 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. Continue developing formal curriculum for fleet operations and maintenance training and schoolhouse training systems for future Ford class carrier crews. Provide interim training for crews until formal curriculum is completed and approved. ***FY 2018 Base Plans:*** 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 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. Continue developing formal curriculum for fleet operations and maintenance training and schoolhouse training systems for future Ford class carrier crews. Provide interim training for crews until formal curriculum is completed and approved. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	12.195	37.685	25.989	0.000	25.989

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• RDTEN / 0604567N: *Project Units 3108, 3179, 4007*	18.151	50.920	54.131	-	54.131	51.235	47.338	46.024	46.918	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	**Project (Number/Name)** 4004 / *EMALS*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• SCN / 2001: *Carrier Replacement Program*	2,431.929	2,662.567	4,461.772	-	4,461.772	1,576.966	2,234.571	2,966.013	2,351.884	2,326.440	38,479.270
• SCN / 5300: *Completion of Prior Year Shipbuilding Programs*	123.760	0.000	20.000	-	20.000	0.000	0.000	0.000	0.000	0.000	1,394.860
• OMN / 1B2B: *CVN 78 Ford Class Training and Sustainment (12BJ0)*	25.534	14.111	14.099	-	14.099	9.422	8.398	6.580	7.165	Continuing	Continuing
• OPN / 5664: *Surface Training Equipment*	0.000	4.733	12.010	-	12.010	8.039	1.006	5.034	3.024	0.000	33.846
• OPN / 4213: *Aircraft Support Equipment*	87.643	82.179	63.695	-	63.695	65.105	77.503	73.937	74.562	Continuing	Continuing
• OMN / 1B1B: *Mission and Other Ship Operations (11B20)*	0.000	21.000	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).

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: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	**Project (Number/Name)** 4004 / *EMALS*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Aircraft Launch, Recovery & Support	C/CPAF	General Atomics (SDD) : CA	2.000	0.000		0.000		0.000		-		0.000	0.000	2.000	-
Aircraft Launch, Recovery & Support	C/CPFF	General Atomics (ILS BOA) : CA	7.949	9.071	Nov 2015	0.000		0.000		-		0.000	0.000	17.020	-
Primary HW Development	C/CPFF	General Atomics : CA	0.000	0.000		23.568	Nov 2016	15.637	Nov 2017	-		15.637	14.669	53.874	53.874
Training Development	WR	NAWCTSD Orlando : FL	0.000	0.000		9.200	May 2017	7.500	Nov 2017	-		7.500	0.000	16.700	-
		Subtotal	9.949	9.071		32.768		23.137		-		23.137	14.669	89.594	-

Remarks

Primary HW Development to General Atomics (GA) supports Integrated Test & Evaluation efforts which covers previously deferred shock testing, environmental qualification testing and correction of deficiency of launch control subsystem hardware.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Aircraft Launch, Recovery & Support	WR	NAWC Lakehurst : NJ	1.367	2.597	Oct 2015	0.000		0.000		-		0.000	0.000	3.964	-
Integrated Test & Evaluation	WR	NAWC Lakehurst : NJ	0.000	0.000		4.917	Nov 2016	2.852	Nov 2017	-		2.852	1.374	9.143	-
Aircraft Launch, Recovery & Support	WR	NSWC Philadelphia : PA	0.000	0.412	Apr 2016	0.000		0.000		-		0.000	0.000	0.412	-
Aircraft Launch, Recovery & Support	WR	NSWC Dahlgren : VA	0.000	0.115	May 2016	0.000		0.000		-		0.000	0.000	0.115	-
		Subtotal	1.367	3.124		4.917		2.852		-		2.852	1.374	13.634	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	11.316	12.195		37.685		25.989		-		25.989	16.043	103.228	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	Project (Number/Name) 4004 / *EMALS*	

	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	**Project (Number/Name)** 4004 / *EMALS*

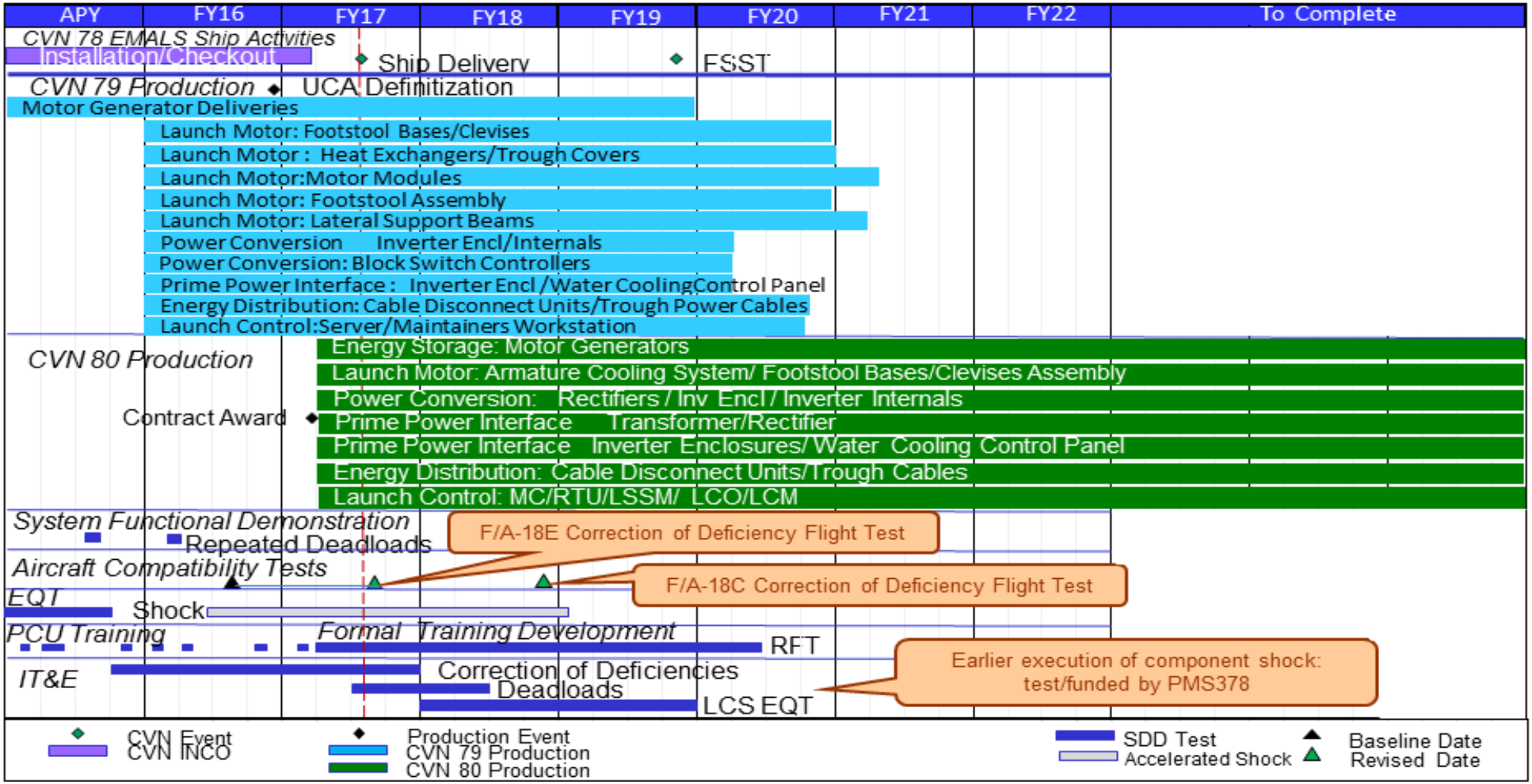

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	**Project (Number/Name)** 4004 / *EMALS*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 4004				
CVN 80 DAB PR	2	2018	2	2018
Milestone C	1	2018	1	2018
EMALS SDD Complete	4	2018	4	2018
EMALS Integrated Test & Evaluation (IT&E)	1	2016	1	2020
DT/IT -4- Developmental Test / Integrated Test Phase 4	1	2016	3	2017
DT/IT -5- Developmental Test / Integrated Test Phase 5	3	2017	2	2019
Component Shock Qualification Testing	2	2016	4	2018
Full Ship Shock Trial	3	2019	4	2019
Initial Operational Test & Evaluation	4	2018	3	2021
OT -C1 - Initial Operational Test & Evaluation - Phase C1	4	2018	3	2019
OT -C2 - Initial Operational Test & Evaluation - Phase C2	1	2020	3	2021
FOT&E - Follow-On Test & Evaluation	3	2021	4	2022
CVN 78 Ship Delivery	3	2017	3	2017
CVN 78 Initial Operational Capability (IOC)	1	2018	1	2018
CVN 80 Advanced Procurement Contract Award	3	2016	3	2016
CVN 80 Construction Contract Award	2	2018	2	2018
CVN 79 SCN Full Funding	1	2016	4	2018
CVN 79 Ship Launch	2	2020	2	2020
CVN 80 SCN Full Funding	1	2018	4	2022

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
9999: *Congressional Adds*	0.000	48.275	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	48.275
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project provides for planning for the Full Ship Shock Trial for the USS Gerald Ford (CVN 78).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017
Congressional Add: CVN-78 Shock Trials	48.275	0.000
FY 2016 Accomplishments: Began planning for CVN 78 Class Shock Trial on CVN 78 in accordance with the Acquisition Decision Memorandum (ADM) dated 7 August 2015.		
FY 2017 Plans: N/A		
Congressional Adds Subtotals	48.275	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• RDTEN / 0604567N: *Project Units 3108, 3179, 4007*	18.151	50.920	54.131	-	54.131	51.235	47.338	46.024	46.918	Continuing	Continuing
• SCN / 2001: *Carrier Replacement Program*	2,555.689	2,662.567	4,461.772	-	4,461.772	1,576.966	2,234.571	2,966.013	2,351.884	2,326.440	38,603.030
• SCN / 5300: *Completion of Prior Year Shipbuilding Programs*	123.760	0.000	20.000	-	20.000	0.000	0.000	0.000	0.000	0.000	1,394.860
• OMN / 1B2B: *CVN 78 Ford Class Training and Sustainment (12BJ0)*	25.534	14.111	14.099	-	14.099	9.422	8.398	6.580	7.165	Continuing	Continuing
• OPN / 5664: *Surface Training Equipment*	0.000	4.733	12.010	-	12.010	8.039	1.006	5.034	3.024	0.000	33.846
• OMN / 1B1B: *Mission and Other Ship Operations*	0.000	21.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	21.000

Remarks

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	**Project (Number/Name)** 9999 / *Congressional Adds*

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 accomplish pre-Shock Trial planning and preparations in support of the CVN 78 Class Full Ship Shock Trial in accordance with the Acquisition Decision Memorandum of 7 August 2015.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy												Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0604122N *I (U)Remote Minehunting System (RMS)*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	20.534	16.940	3.001	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	40.475
0260: *Remote Minehunting Systems*	20.534	16.940	3.001	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	40.475
Program MDAP/MAIS Code: **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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	17.589	3.001	0.000	-	0.000
Current President's Budget	16.940	3.001	0.000	-	0.000
Total Adjustments	-0.649	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.199	0.000			
• SBIR/STTR Transfer	-0.450	0.000			
• Rate/Misc Adjustments	0.000	0.000	0.000	-	0.000

Change Summary Explanation

Program Adjustments:
FY16 -$450K SBIR assessment; -$199K BTR

FY17 - N/A

FY18 - N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604122N / *(U)Remote Minehunting System (RMS)*	Project (Number/Name) 0260 / *Remote Minehunting Systems*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0260: *Remote Minehunting Systems*	20.534	16.940	3.001	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	40.475
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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Product Development	11.970	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2016 Accomplishments: - Upgrade Pre-Reliability Growth Program (RGP) vehicles (v4.0) to final v6.0 configuration including reliability upgrades and LCS Integration ECPs. ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A					
Title: Support	3.920	2.001	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2016 Accomplishments: - Provide engineering, logistics, and programmatic support for v6.0 upgrade efforts. - Conduct post-upgrade inspections. - Provide engineering, logistics, and programmatic support for RMMV Integration/Maintenance contract. - Support S&T transitions to LRIP 1 fleet. - Provide planning support for RMMV Technology Refresh and Overhaul efforts.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604122N / *(U)Remote Minehunting System (RMS)*	**Project (Number/Name)** 0260 / *Remote Minehunting Systems*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Provide engineering support for correction of deficiencies efforts. ***FY 2017 Plans:*** - Provide engineering, logistics, and programmatic support for IRT recommendations. ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A					
Title: Management	1.050	1.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2016 Accomplishments: - Provide program management and oversight of RMMV v6.0 upgrades. - Provide program management and oversight of RMMV Integration/Maintenance contract. - Support for the Independent Review Team (IRT) ***FY 2017 Plans:*** - Provide program management and oversight of IRT recommendations. ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	16.940	3.001	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• OPN/1605: *Remote Minehunting System (RMS)*	53.077	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	53.077

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604122N / *(U)Remote Minehunting System (RMS)*	**Project (Number/Name)** 0260 / *Remote Minehunting Systems*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost

Remarks

On 24 Mar 2016, USD AT&L issued an ADM cancelling the RMS program. USD AT&L granted authority to continue the necessary contract actions to sustain the 10 RMMVs, and to execute the IRT recommendations to overhaul the LRIP 1 units and support the LCS MCM MP Deployment and FY19 Minehunting Assessment.

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: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604122N / *(U)Remote Minehunting System (RMS)*	Project (Number/Name) 0260 / *Remote Minehunting Systems*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Hardware Development & Integration	Various	LOCKHEED MARTIN : West Palm Beach, FL	13.318	11.020	Nov 2015	0.000		0.000		-		0.000	0.000	24.338	-
SBIR Transition	Various	Various : Various	0.678	0.950	Jan 2016	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	14.996	11.970		0.000		0.000		-		0.000	0.000	26.966	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering/ILS	WR	NSWC/PCD : Panama City, FL	1.731	3.474	Oct 2015	1.751	Oct 2016	0.000		-		0.000	0.000	6.956	-
Engineering Support	WR	NUWC/NPT : Newport, RI	0.511	0.233	Nov 2015	0.250	Nov 2016	0.000		-		0.000	0.000	0.994	-
Engineering Support	WR	PORTSMOUTH NSY : Portsmouth, NH	0.308	0.213	Nov 2015	0.000		0.000		-		0.000	0.000	0.521	-
		Subtotal	2.550	3.920		2.001		0.000		-		0.000	0.000	8.471	-

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 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	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604122N / *(U)Remote Minehunting System (RMS)*	**Project (Number/Name)** 0260 / *Remote Minehunting Systems*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Management Support	C/CPFF	TBD : TBD	0.647	1.000	Dec 2015	1.000	Dec 2016	0.000		-		0.000	0.000	2.647	-
Travel	WR	NAVSEA : WNY, DC	0.041	0.050	Jan 2016	0.000		0.000		-		0.000	0.000	0.091	-
		Subtotal	0.688	1.050		1.000		0.000		-		0.000	0.000	2.738	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	20.534	16.940		3.001		0.000		-		0.000	0.000	40.475	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604122N / *(U)Remote Minehunting System (RMS)*	**Project (Number/Name)** 0260 / *Remote Minehunting Systems*

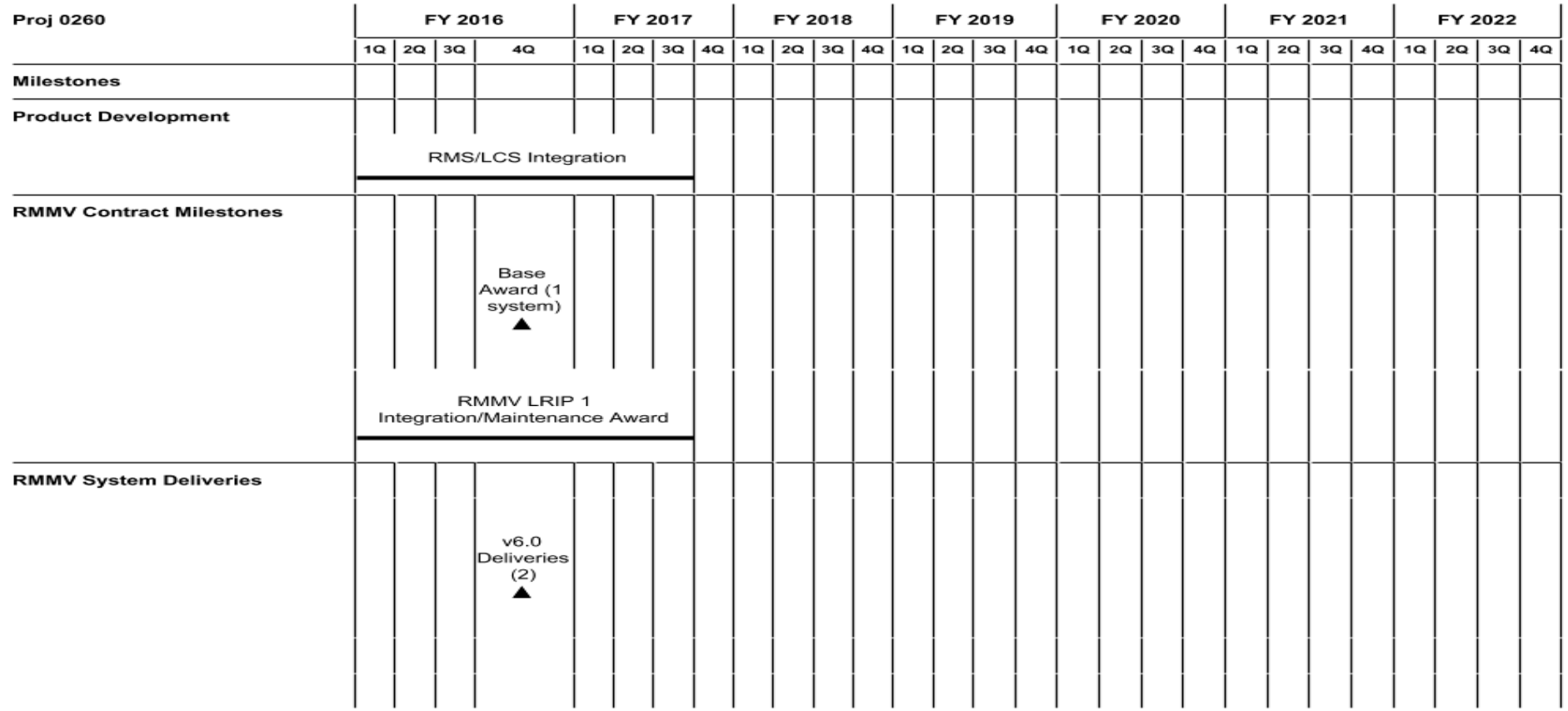

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Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604122N / *(U)Remote Minehunting System (RMS)*	**Project (Number/Name)** 0260 / *Remote Minehunting Systems*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 0260				
Product Development: RMS/LCS Integration	1	2016	3	2017
RMMV Contract Milestones: Base Production Award (1 system)	4	2016	4	2016
RMMV Contract Milestones: RMMV LRIP 1 Integration/Maintenance (Legacy Configuration) Award	1	2016	3	2017
RMMV System Deliveries: v6.0 Deliveries (2)	4	2016	4	2016

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0604272N *I Tact Air Dir Infrared CM (TADIRCM)*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	12.977	18.963	72.910	46.844	5.710	52.554	47.991	49.652	52.754	36.166	Continuing	Continuing
3304: *CIRCM*	12.977	18.963	72.910	5.965	-	5.965	9.943	9.935	6.931	4.940	223.938	366.502
3348: *DAIRCM Development*	0.000	0.000	0.000	40.879	5.710	46.589	38.048	39.717	45.823	31.226	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 Needs 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 system.

FY 2018 - FY2022 RDT&E funding required for an integrated (under glass) DAIRCM lead and follow-on AH-1Z, UH-1Y and MH-60 platform integration and completion of the 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: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604272N *I Tact Air Dir Infrared CM (TADIRCM)*

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	18.969	34.920	38.009	-	38.009
Current President's Budget	18.963	72.910	46.844	5.710	52.554
Total Adjustments	-0.006	37.990	8.835	5.710	14.545
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.006	0.000			
• SBIR/STTR Transfer	-	-			
• Program Adjustments	0.000	37.990	9.000	5.710	14.710
• Rate/Misc Adjustments	0.000	0.000	-0.165	-	-0.165

Change Summary Explanation

Schedule:

Project Unit 3304 Common Infrared Countermeasures (CIRCM): Integrated Operational Test & Evaluation (IOT&E) from 4th Qtr. FY 2018 through 4th Qtr. FY 2019 to 4th Qtr. FY 2019 through 4th Qtr. FY 2020; Navy Development Test & Evaluation Engineering Manufacturing Development (DT&E-EMD) from 2nd Qtr. FY 2016 through 2nd Qtr. FY 2018 to 2nd Qtr. FY 2017 through 1st Qtr FY 2019; Navy Test Readiness Review (TRR) from 2nd Qtr. FY 2017 to 3rd Qtr. FY 2019; All tasks are on schedule and to be completed by the Army.

Project Unit 3348 Federated Distributed Apertured Infrared Countermeasures (DAIRCM): Joint Urgent Operational Needs Statement development, integration and test started 2nd Qtr. FY 2016 through 2nd Qtr. FY 2018; Quick Reaction Assessment (QRA), 2nd Qtr. FY 2018. Common Aircraft Survivability Equipment DAIRCM INC II Blue/Green BISOG RDT&E funding (supporting United States Navy and United States Marine Corps requirements) for lead platform integration and completion of Engineering Change Proposal to Program of Record (PoR). PoR for DAIRCM to eventually support integration and retrofit of 300 USMC AH-1Z/UH-1Y and 397 USN MH-60R/S aircraft. Development integration and test will continue FY 2018 through FY 2022.

PU 3348 DAIRCM Development Schedule reflects the unanticipated proliferation of a specific threat to assault rotary wing aircraft in Central Command, the United States Special Operations Command submitted a Joint Urgent Operational Needs Statement (JUONS) through the Joint Capabilities Integration and Development System process on 30MAR15. The JUONS was validated by the Joint Staff on 24APR15. The JRAC directed the services on 29MAY15 to provide a material solution that meets the requirements of the JUONS. Funding for the DAIRCM system was received via Rapid Acquisition Authority in Jan 2016. UCAs were awarded in March 2016. Transition from JUONS to POR will begin in 2018.

NOTE: Current schedule was revised to include the implementation of the DAIRCM planned program of record.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604272N / *Tact Air Dir Infrared CM (TADIRCM)*	Project (Number/Name) 3304 / *CIRCM*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3304: *CIRCM*	12.977	18.963	72.910	5.965	-	5.965	9.943	9.935	6.931	4.940	223.938	366.502
Quantity of RDT&E Articles		-	5	8	-	8	-	-	-	-		

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 missile 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.

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 missile 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 with follow-on work to begin in FY 2018 to provide an integrated (under glass) solution to the host platforms. This project 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.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: CIRCM Technology Development (TD)	18.963	72.910	5.965	0.000	5.965
Articles:	-	5	8	-	8
FY 2016 Accomplishments: CIRCM entered the Engineering Manufacturing Development (EMD) phase in 4QTR FY 2016. The CIRCM Critical Design Review is scheduled for 4Qtr. FY 2016.					
FY 2017 Plans: Begin Development Test and Evaluation (DT&E) phase of the EMD.					
FY 2018 Base Plans: Continuation of EMD contract.					
FY 2018 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604272N / *Tact Air Dir Infrared CM (TADIRCM)*	**Project (Number/Name)** 3304 / *CIRCM*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Continuation of EMD contract.					
Accomplishments/Planned Programs Subtotals	18.963	72.910	5.965	0.000	5.965

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 TD, 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, 5 EMD test articles in FY 2017 and extensive testing. Following EMD there will be Low Rate Initial Production (LRIP) phase where full qualification testing is conducted to support an Army first unit equipped date of FY 2020. There will be 8 Navy LRIP units delivered in FY 2018. The Navy's Initial Operational Capability (IOC) will be in FY 2021.

The federated DAIRCM was started as a 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 2018. 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 2022.

E. Performance Metrics

FY2015:
Achievement of Milestone B. Successful EMD contract award by US Army.

FY2016:
Successful critical design review.

FY2017:
Successful exercise of Navy option on Army EMD contract for EMD test assets.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604272N / *Tact Air Dir Infrared CM (TADIRCM)*	Project (Number/Name) 3348 / *DAIRCM Development*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3348: *DAIRCM Development*	0.000	0.000	0.000	40.879	5.710	46.589	38.048	39.717	45.823	31.226	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 missile 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 with follow-on work to begin in FY 2018 to provide an integrated (under glass) solution to the host platforms. This project 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.

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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: DAIRCM Development	0.000	0.000	40.879	5.710	46.589
Articles:	-	-	-	-	-
FY 2016 Accomplishments: N/A					
FY 2017 Plans: N/A					
FY 2018 Base Plans: Planning is beginning in FY 2018 to support Integrated DAIRCM efforts.					
FY 2018 OCO Plans: Planning is beginning in FY 2018 to support Integrated DAIRCM efforts.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	40.879	5.710	46.589

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604272N / *Tact Air Dir Infrared CM (TADIRCM)*	**Project (Number/Name)** 3348 / *DAIRCM Development*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

The federated Distributed Aperture Infrared Countermeasures (DAIRCM) was started as a solution to Joint Urgent Operational Needs Statement (JUONS) SO-0010 and funded via Rapid Acquisition Authority (RAA) with follow-on funding supplied via FY 2017 (PU 3304) and FY 2018 (PU 3348) Overseas Contingency Operations funding to complete the development, integration and test to support initial fielding in FY18. 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 2022.

E. Performance Metrics

FY 2018: Award of ECP to meet statutory regulations.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604272N / *Tact Air Dir Infrared CM (TADIRCM)*	**Project (Number/Name)** 3348 / *DAIRCM Development*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary HW Dev DAIRCM	C/CPFF	DRS : Dallas, TX	0.000	0.000		0.000		10.237	Jan 2018	-		10.237	37.484	47.721	47.918
Primalry HW Dev DAIRCM	C/CPFF	Daylight Solutions : San Diego, CA	0.000	0.000		0.000		3.194	Jan 2018	-		3.194	27.485	30.679	30.679
H-1 Operational Flight Program Dev	C/CPFF	Lockheed Martin : Owego, NY	0.000	0.000		0.000		9.420	Jan 2018	-		9.420	Continuing	Continuing	Continuing
H-60 Operational Flight Program Deve	C/CPFF	Northrop Grumman : Woodland HIlls, CA	0.000	0.000		0.000		5.943	Jan 2018	-		5.943	35.000	40.943	40.943
		Subtotal	0.000	0.000		0.000		28.794		-		28.794	-	-	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Govt Integrated Logistic Support	WR	NAWCAD : Patuxent River, MD	0.000	0.000		0.000		0.200	Oct 2017	-		0.200	2.000	2.200	-
Govt Integrated Logistic Support	WR	NAWCWD : Point Mugu, CA	0.000	0.000		0.000		0.065	Oct 2017	-		0.065	2.000	2.065	-
Govt Integrated Logistic Support	WR	NAWCWD : China Lake, CA	0.000	0.000		0.000		0.063	Oct 2017	-		0.063	2.000	2.063	-
Govt Integrated Logistic Support	WR	Fleet Readiness Center : Jacksonville, FL	0.000	0.000		0.000		0.350	Oct 2017	-		0.350	2.000	2.350	-
Govt Integrated Logistic Support	WR	NAWCTSD : Pensacola, FL	0.000	0.000		0.000		0.200	Oct 2017	-		0.200	2.000	2.200	-
Contractor Logistic Support	SS/CPFF	RIAC : Ft Belvoir, VA	0.000	0.000		0.000		0.622	Oct 2017	-		0.622	2.000	2.622	2.622
Contractor Logistic Support	TBD	TBD : TBD	0.000	0.000		0.000		0.010	Oct 2017	-		0.010	2.000	2.010	2.010
Material/Equipment	WR	NAVSEA : Crane, IN	0.000	0.000		0.000		0.367	Oct 2017	-		0.367	2.000	2.367	-
Commercial Transportation	TBD	Various : Various	0.000	0.000		0.000		0.008	Oct 2017	-		0.008	0.000	0.008	-
		Subtotal	0.000	0.000		0.000		1.885		-		1.885	16.000	17.885	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604272N / *Tact Air Dir Infrared CM (TADIRCM)*	**Project (Number/Name)** 3348 / *DAIRCM Development*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Govt T&E Support	WR	NAWCAD : Patuxent River, MD	0.000	0.000		0.000		0.000	Oct 2017	0.210	Oct 2017	0.210	4.000	4.210	-
Govt T&E Support	WR	NAWCWD : China Lake, CA	0.000	0.000		0.000		0.000	Oct 2017	1.500	Oct 2017	1.500	4.000	5.500	-
Live Fire	WR	TBD : TBD	0.000	0.000		0.000		0.000	Oct 2017	4.000	Oct 2017	4.000	8.000	12.000	-
Contractor T& E Support	TBD	GWEF : Eglin AFB, FL	0.000	0.000		0.000		0.000		-		0.000	3.000	3.000	3.000
Govt T&E Support	WR	COTF : Norfolk, VA	0.000	0.000		0.000		0.000		-		0.000	1.000	1.000	-
		Subtotal	0.000	0.000		0.000		0.000		5.710		5.710	20.000	25.710	-

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Govt Eng Support	WR	NAWCAD : Patuxent River, MD	0.000	0.000		0.000		1.500	Oct 2017	-		1.500	4.000	5.500	-
Govt Eng Support	WR	NAWCWD : Pt Mugu, CA	0.000	0.000		0.000		0.500	Oct 2017	-		0.500	4.000	4.500	-
Govt Eng Support	WR	NRL : Washington, DC	0.000	0.000		0.000		3.000	Oct 2017	-		3.000	6.000	9.000	-
Govt Eng Support	WR	NAWCWD : China Lake, CA	0.000	0.000		0.000		0.200	Oct 2017	-		0.200	1.000	1.200	-
Govt Eng Support	WR	Fleet Readiness Center : Jacksonville, FL	0.000	0.000		0.000		0.200	Oct 2017	-		0.200	1.000	1.200	-
Amelex Contractor Mgmt Support	C/CPFF	NAWCAD : Patuxent River, MD	0.000	0.000		0.000		0.200	Nov 2017	-		0.200	0.900	1.100	1.100
Engility Contractor Eng Support	C/CPFF	NAWCAD : Patuxent River, MD	0.000	0.000		0.000		0.200	Jun 2018	-		0.200	0.000	0.200	0.200
Contractor Eng Support	TBD	NRL : Washington, DC	0.000	0.000		0.000		0.200	Apr 2018	-		0.200	0.000	0.200	0.200

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604272N / *Tact Air Dir Infrared CM (TADIRCM)*	**Project (Number/Name)** 3348 / *DAIRCM Development*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Eng Support H-1 MC SW	TBD	TBD : TBD	0.000	0.000		0.000		4.000	Apr 2018	-		4.000	0.000	4.000	4.000
Travel DAIRCM	WR	NAVAIR Various : Patuxent River, MD	0.000	0.000		0.000		0.200	Dec 2017	-		0.200	1.000	1.200	-
Govt Eng Support	WR	NSWC : Dahlgren, VA	0.000	0.000		0.000		0.000		-		0.000	1.000	1.000	-
		Subtotal	0.000	0.000		0.000		10.200		-		10.200	18.900	29.100	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		0.000		40.879		5.710		46.589	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604272N / *Tact Air Dir Infrared CM (TADIRCM)*	**Project (Number/Name)** 3348 / *DAIRCM Development*

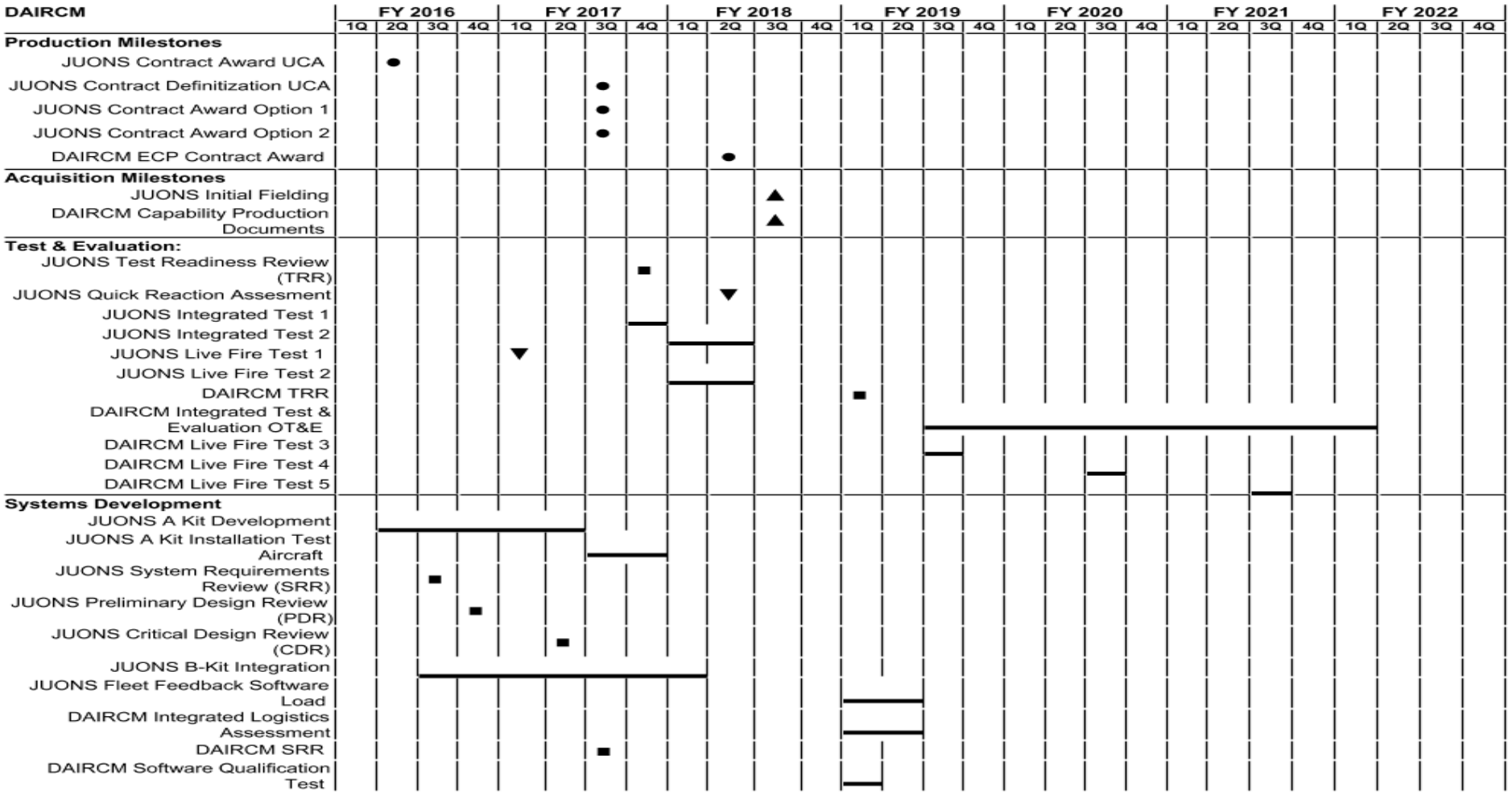
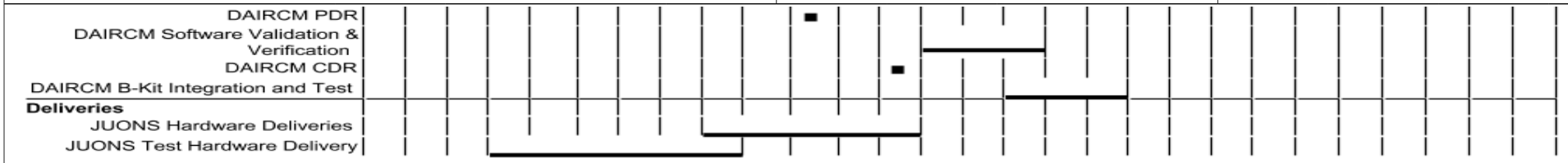


Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604272N / *Tact Air Dir Infrared CM (TADIRCM)*	**Project (Number/Name)** 3348 / *DAIRCM Development*



2018OSD - 0604272N - 3348

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604272N / *Tact Air Dir Infrared CM (TADIRCM)*	**Project (Number/Name)** 3348 / *DAIRCM Development*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
DAIRCM				
Production Milestones: JUONS Contract Award UCA: Schedule Detail	2	2016	2	2016
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 ECP Contract Award: Schedule Detail	2	2018	2	2018
Acquisition Milestones: JUONS Initial Fielding: Schedule Detail	3	2018	3	2018
Acquisition Milestones: DAIRCM Capability Production Documents: Schedule Detail	3	2018	3	2018
Test & Evaluation:: JUONS Test Readiness Review (TRR): Schedule Detail	4	2017	4	2017
Test & Evaluation:: JUONS Quick Reaction Assesment: Schedule Detail	2	2018	2	2018
Test & Evaluation:: JUONS Integrated Test 1: Schedule Detail	4	2017	4	2017
Test & Evaluation:: JUONS Integrated Test 2: Schedule Detail	1	2018	2	2018
Test & Evaluation:: JUONS Live Fire Test 1: Schedule Detail	1	2017	1	2017
Test & Evaluation:: JUONS Live Fire Test 2: Schedule Detail	1	2018	2	2018
Test & Evaluation:: DAIRCM TRR: Schedule Detail	1	2019	1	2019
Test & Evaluation:: DAIRCM Integrated Test & Evaluation OT&E: Schedule Detail	3	2019	1	2022
Test & Evaluation:: DAIRCM Live Fire Test 3: Schedule Detail	3	2019	3	2019
Test & Evaluation:: DAIRCM Live Fire Test 4: Schedule Detail	3	2020	3	2020
Test & Evaluation:: DAIRCM Live Fire Test 5: Schedule Detail	3	2021	3	2021
Systems Development: JUONS A Kit Development: Schedule Detail	2	2016	2	2017
Systems Development: JUONS A Kit Installation Test Aircraft: Schedule Detail (TEST)	3	2017	4	2017
Systems Development: JUONS System Requirements Review (SRR): Schedule Detail	3	2016	3	2016

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604272N / *Tact Air Dir Infrared CM (TADIRCM)*	**Project (Number/Name)** 3348 / *DAIRCM Development*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Systems Development: JUONS Preliminary Design Review (PDR): Schedule Detail	4	2016	4	2016
Systems Development: JUONS Critical Design Review (CDR): Schedule Detail	2	2017	2	2017
Systems Development: JUONS B-Kit Integration: Schedule Detail	3	2016	1	2018
Systems Development: JUONS Fleet Feedback Software Load: Schedule Detail	1	2019	2	2019
Systems Development: DAIRCM Integrated Logistics Assessment: Schedule Detail	1	2019	2	2019
Systems Development: DAIRCM SRR: Schedule Detail	3	2017	3	2017
Systems Development: DAIRCM Software Qualification Test: Schedule Detail	1	2019	1	2019
Systems Development: DAIRCM PDR: Schedule Detail	3	2018	3	2018
Systems Development: DAIRCM Software Validation & Verification: Schedule Detail	2	2019	4	2019
Systems Development: DAIRCM CDR: Schedule Detail	1	2019	1	2019
Systems Development: DAIRCM B-Kit Integration and Test: Schedule Detail	4	2019	2	2020
Deliveries: JUONS Hardware Deliveries: Software Qualification test	1	2018	1	2019
Deliveries: JUONS Test Hardware Delivery: Schedule Detail	4	2016	1	2018

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604279N *I (U)ASE Self Protection Optimization*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	17.911	8.995	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	26.906
3308: *Technology Development*	2.902	2.438	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	5.340
3309: *Assault Survivability Optimization*	15.009	6.557	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	21.566

Note

PE 0604279N consolidated to PE 0604270N beginning in FY 2017.

A. Mission Description and Budget Item Justification

This element includes development of Aircraft Survivability Equipment (ASE) and Electronic Warfare (EW)/countermeasures solutions for the United States Navy, United States Marine Corps and Coalition Aircraft to include studies and evaluations of current and future aircraft threats, modeling and simulation for improved countermeasure capabilities and development and testing to address new and emerging threats.

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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	7.874	0.000	0.000	-	0.000
Current President's Budget	8.995	0.000	0.000	-	0.000
Total Adjustments	1.121	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	1.200	0.000			
• SBIR/STTR Transfer	-0.080	0.000			
• Rate/Misc Adjustments	0.001	0.000	0.000	-	0.000

Change Summary Explanation

Cost:

Project Unit 3309 / Assault Survivability Optimization:

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604279N *I (U)ASE Self Protection Optimization*

FY 2015 Reprogramming Action - Prior Approval (PA), DoD Serial Number FY 15-28 PA signed 27 August 2015 to address Joint Urgent Operational Need (JUON) (JUONS SO-0010) to improve the current system-of-systems detect, declare and defeat solution against newly proliferated advanced Man-portable Air Defense Systems (MANPADS). Overseas Contingency Operations (OCO) Issue Sheet #15-401-R dated 15 October 2015 for $1.2 million. Additional $1.2 million baseline funding received May 2016 for JUONS SO-0010.

Schedule:
Project Unit 3308 / Technology Development:
Software Release 15 added to 1Q FY16. Software Release 16 moved from 3Q FY16 to 1Q FY17 to better align with Program Related Engineering (PRE) software releases; this is reflected in the budget PE 0604270N. Software Technique Development completion moved from 4Q FY16 to 3Q FY15 to annualize effort. FY16 Software Technique Development 1Q FY16 through 3Q FY16 added to schedule. FY15 Integrated Evaluation (IE) moved from 2Q FY15 through 4Q FY15 to 1Q FY16, and reduced to a 1Q event. FY16 IE moved from 2Q FY16 through 4Q FY16 to 4Q FY16 as a 1Q event.

Project Unit 3309 / Assault Survivability Optimization:
FY15 CH-53E flight test delayed until August 2016 due to test range schedule (other available test ranges could not accommodate required flight test profiles). Schedule revised to include efforts to support JUONS SO-0010. P-8A effectiveness flight test postponed due to aircraft availability. MJU-67 contract award delayed from 2Q FY16 to 4Q FY16. Test articles quantity increased from 1,500 to 1,552 to accommodated testing requirements based on FY17 test schedule. MV-22 and UH-1Y JUONS Operational MDF delay until 3rd Quarter FY17 due to test results data review and approval process.

Technical: N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604279N / *(U)ASE Self Protection Optimization*	Project (Number/Name) 3308 / *Technology Development*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3308: *Technology Development*	2.902	2.438	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	5.340
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project Unit (PU) 3308 / Technology Development: Funds efforts that focus on the quick reaction prototyping of tactical Electronic Warfare (EW) / countermeasures solutions for increased survivability providing friendly forces the self-protection necessary for successful mission accomplishment. This program directly addresses the operational requirement of strike platforms for optimization of EW/countermeasure solutions across the Department of the Navy. Improved countermeasure capabilities and techniques through modeling and simulation, validated in subsequent field testing to address new and emerging threats, capitalize upon upgrades to Aircraft Survivability Equipment systems capabilities for strike platforms and evaluate new radio frequency countermeasure and infra red countermeasure technologies.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Technology Development	2.438	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Continued EW vulnerability studies/analysis, product development and test conducted for strike aircraft.					
FY 2017 Plans: N/A					
FY 2018 Base Plans: N/A					
FY 2018 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	2.438	0.000	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

EW vulnerability studies/analysis, product development and test conducted for strike aircraft across the Future Years Defense Program (FYDP).

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604279N / *(U)ASE Self Protection Optimization*	**Project (Number/Name)** 3308 / *Technology Development*

E. Performance Metrics

Electronic Warfare (EW) vulnerability studies/analysis, product development and test conducted for strike aircraft across the Future Years Defense Program (FYDP).

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604279N / *(U)ASE Self Protection Optimization*	Project (Number/Name) 3309 / *Assault Survivability Optimization*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3309: *Assault Survivability Optimization*	15.009	6.557	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	21.566
Quantity of RDT&E Articles	625	1,552	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project funds the development, testing and rapid fielding of advanced countermeasures and enhanced employment techniques needed to support current and future operations for United States Navy and United States Marine Corps aircraft. Incorporates capability advancements in Aircraft Survivability Equipment (ASE) and expendable countermeasures to develop and deploy countermeasure responses resulting in increased platform survivability. Resources will be applied to the following areas: 1) studies and evaluations to optimize current countermeasures and ASE capabilities, 2) development and demonstration of advanced expendable countermeasures and countermeasure techniques, 3) testing and evaluation of advanced countermeasures, 4) development of system software for the testing and deployment of advanced countermeasure techniques, and 5) development of and upgrades to modeling tools and specialized equipment required to conduct evaluation of advanced countermeasures.

FY 2016 flight test effectiveness testing to be conducted using Non-Combat Expenditure Allowance (NCEA) of current countermeasures. Advanced countermeasures procured in FY 2016 and delivered within 12 months will support flight test for optimized/advanced countermeasures techniques in FY 2017. The identified countermeasure quantity is required by Air Expendable Countermeasures Test and Evaluation Master Plan #1480 to complete the flight testing for test Mission Data Files (MDF) and optimized/advanced countermeasures techniques (RDT&E Articles are advanced air expendable countermeasures).

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Analysis and Development of Advanced Countermeasures and Countermeasure Techniques	6.557	0.000	0.000	0.000	0.000
Articles:	1,552	-	-	-	-
FY 2016 Accomplishments: Conducted modeling and simulation to develop enhanced countermeasure techniques for the P-8A platform. Continued development advanced countermeasure techniques on MV-22, MH-60S and UH-1Y platforms in support of FY 2016 flight test evaluations in support of JUONS SO-0010. 1,552 test articles procured in FY 2016 are advanced expendable countermeasures for flight effectiveness testing/optimization flight tests in FY 2017. Completed engineering and evaluation for advanced countermeasures for future threats and technology insertion into manned-flight simulator. Established radio frequency countermeasure modeling and simulation capability to address advanced threats.					
FY 2017 Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604279N / *(U)ASE Self Protection Optimization*	**Project (Number/Name)** 3309 / *Assault Survivability Optimization*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	6.557	0.000	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Acquisition strategy is to leverage improvements in air expendable countermeasures technology and in Aircraft Survivability Equipment (ASE) integration to enhance platform survivability on United States Navy and United States Marine Corps platforms through more effective dispense techniques, investing in enhancements in modeling and simulation tools to better evaluate countermeasure effectiveness, upgrading test and evaluation equipment to incorporate current and future threats for effectiveness tests and developing and demonstrating advanced concept countermeasures for future threats. Advanced countermeasures procured in FY 2016 and delivered within 12 months will support flight test for optimized/advanced countermeasure techniques in FY 2017. New advanced countermeasures are then transitioned to the Procurement of Ammunition Navy and Marine Corps appropriation for procurement and fielding. New optimized and advanced countermeasure techniques are delivered to government software support activities for fleet release to increase aircraft/aircrew survivability.

E. Performance Metrics

Maintain Air Expendable Countermeasures (AECM) ORD: #512-88-89 dated 28 May 99 requirement to provide operationally effective mixture of countermeasures that can be employed to degrade and/or neutralize the effectiveness of current and projected threats at or above threshold levels for key performance parameters for aircraft survivability. Countermeasure Techniques developed for improved survivability are further supported by Statement of Functionality for Aircraft Survivability Equipment Smart Dispense, dated 19 January 2012. Project Unit 3309 efforts will continue to change in response to this requirement when similar threat proliferation, advances in countermeasures technology and integrated ASE capability advancements are accomplished.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604286M *I (U)Marine Corps Additive Manufacturing Tech Dev*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	0.000	0.000	0.000	6.200	-	6.200	6.200	4.300	3.700	3.400	Continuing	Continuing
2741: *Additive Manufacturing*	0.000	0.000	0.000	6.200	-	6.200	6.200	4.300	3.700	3.400	Continuing	Continuing

Note

This is a new start in FY18

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.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	6.200	-	6.200
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	6.200	-	6.200

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604286M / *(U)Marine Corps Additive Manufacturing Tech Dev*	Project (Number/Name) 2741 / *Additive Manufacturing*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2741: *Additive Manufacturing*	0.000	0.000	0.000	6.200	-	6.200	6.200	4.300	3.700	3.400	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

This is a new start in FY18

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.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Expeditionaly Logistics - Legacy Equipment and System Readiness Support	0.000	0.000	4.050	0.000	4.050
Articles:	-	-	-	-	-
FY 2016 Accomplishments: N/A					
FY 2017 Plans: N/A					
FY 2018 Base Plans: -Initiate efforts to identify and develop Additive Manufacturing (AM) requirements, verification methods, and technical data needed to acquire AM manufactured components. -Initiate fabrication of prototype hardware, fixtures, and jigs that facilitate design processes and procedures for test and performance verification.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604286M / *(U)Marine Corps Additive Manufacturing Tech Dev*	**Project (Number/Name)** 2741 / *Additive Manufacturing*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
-Initiate prototype testing to verify component design and reliability attributes. ***FY 2018 OCO Plans:*** N/A					
Title: Expeditionary Logistics - Expeditionary Manufacturing and Repair Processes ***Articles:*** ***FY 2016 Accomplishments:*** N/A ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** - Initiate system engineering efforts to identify and develop AM fabrication requirements, field repair procedures, and technical data needed to effectively repair AM manufactured components. - Initiate certification studies to assess potential performance/integration issues with expeditionary repaired AM parts. ***FY 2018 OCO Plans:*** N/A	0.000 -	0.000 -	2.150 -	0.000 -	2.150 -
Accomplishments/Planned Programs Subtotals	0.000	0.000	6.200	0.000	6.200

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. For that reason, the AM investments are designed to explore future requirements where AM may provide a warfighting solution, and to mitigate AM-related risk within existing programs of record.

E. Performance Metrics

N/A

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy												Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0604292N *I (U)MH-XX*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	3.007	4.462	1.620	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	9.089
2934: *MH-XX*	3.007	4.462	1.620	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	9.089

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. These activities will result in completion of all acquisition documentation required for a Material Development Decision in first quarter FY 2017. 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	4.516	1.620	1.537	-	1.537
Current President's Budget	4.462	1.620	0.000	-	0.000
Total Adjustments	-0.054	0.000	-1.537	-	-1.537
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.054	0.000			
• Program Adjustments	0.000	0.000	-1.537	-	-1.537
• Rate/Misc Adjustments	0.000	0.000	0.000	-	0.000

Change Summary Explanation

Technical: Not applicable.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604292N *I (U)MH-XX*

Schedule: Due to the termination of MH-XX in FY 2018, the schedule has been updated to remove Analysis of Alternatives, Program Planning and Documentation, and Technology Maturation and Risk Reduction and added the delivery of a Business Metrics White Paper and an Reference Architecture White Paper. The development and delivery of the Business Metrics White Paper will inform future software development efforts. This product will provide guidance for defining and measuring software development progress and will identify key cost metrics to capture and forecast software costs. Additionally, the Reference Architecture White Paper will define key architectural parameters to guide the acquisition of Future Vertical Lift (FVL) capabilities. This effort will establish a common technical framework for capability acquisition, representing an opportunity to align Navy FVL investments and inform investments across the Armed Services.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604292N / *(U)MH-XX*	Project (Number/Name) 2934 / *MH-XX*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2934: *MH-XX*	3.007	4.462	1.620	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	9.089
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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: MH-XX Requirements Definition and Acquisition Documentation	4.462	1.620	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Support to the JMR TD program to identify key maritime technologies; completion of pre-system acquisition activities which include Joint Requirement Capabilities Board approval of the ICD and Cost Assessment and Program Evaluation approval of the AOA Study Guidance and AOA Study Plan leading to a Material Development Decision in 1QTR FY 2017.					
FY 2017 Plans: Continue to support the JMR TD program to identify key maritime technologies. Development of business metrics white paper to inform future software development efforts. Development of architecture white paper to define key architectural parameters to guide future vertical lift capabilities.					
FY 2018 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604292N / *(U)MH-XX*	**Project (Number/Name)** 2934 / *MH-XX*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	4.462	1.620	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

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-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604320M *I Rapid Technology Capability Prototype*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	0.000	0.000	0.000	7.055	-	7.055	7.196	7.340	7.487	7.637	Continuing	Continuing
0386: *Rapid Prototype Development, Marine Corps*	0.000	0.000	0.000	7.055	-	7.055	7.196	7.340	7.487	7.637	Continuing	Continuing

Note

This PE is a new-start for FY18.

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.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	7.055	-	7.055
Total Adjustments	0.000	0.000	7.055	-	7.055
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Program Adjustments	0.000	0.000	7.055	-	7.055

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604320M / *Rapid Technology Capability Prototype*	Project (Number/Name) 0386 / *Rapid Prototype Development, Marine Corps*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0386: *Rapid Prototype Development, Marine Corps*	0.000	0.000	0.000	7.055	-	7.055	7.196	7.340	7.487	7.637	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

This PE is a new-start for FY18

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.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Product Development	0.000	0.000	5.630	0.000	5.630
Articles:	-	-	-	-	-
FY 2016 Accomplishments: N/A					
FY 2017 Plans: N/A					
FY 2018 Base Plans: - Initiate Certifications/Studies/Reports and Prototype Purchase/Development/Integration of MCRCO portfolio: - Initiate product development of Tactical Electro-Magnetic Spectrum capabilities. - Initiate product development of unmanned aerial, surface, and underwater vehicles (UAV, USV, and UUV) swarm capability.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604320M / *Rapid Technology Capability Prototype*	**Project (Number/Name)** 0386 / *Rapid Prototype Development, Marine Corps*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Initiate product development of a Long Range Precision Fires capability. ***FY 2018 OCO Plans:*** N/A					
Title: Support ***Articles:***	0.000 -	0.000 -	1.050 -	0.000 -	1.050 -
FY 2016 Accomplishments: N/A ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** - Initiate Operational Force Assessments of MCRCO portfolio: - Initiate support of Tactical Electro-Magnetic Spectrum capabilities. - Initiate support of unmanned aerial, surface, and underwater vehicles (UAV, USV, and UUV) swarm capability. - Initiate support development and operational assessment of a Long Range Precision Fires capability. ***FY 2018 OCO Plans:*** N/A					
Title: Management ***Articles:***	0.000 -	0.000 -	0.375 -	0.000 -	0.375 -
FY 2016 Accomplishments: N/A ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** - Initiate Management Services of the new-start MCRCO: Engineering Analysis and program office support ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.000	0.000	7.055	0.000	7.055

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604320M / *Rapid Technology Capability Prototype*	**Project (Number/Name)** 0386 / *Rapid Prototype Development, Marine Corps*

C. Other Program Funding Summary ($ in Millions)

N/A

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-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604454N *I (U)LX (R)*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	32.522	73.392	6.354	9.578	-	9.578	5.657	12.752	12.581	3.273	Continuing	Continuing
2474: *LX(R) Design & Total Ship Integration*	32.522	45.392	6.354	9.578	-	9.578	5.657	12.752	12.581	3.273	Continuing	Continuing
9999: *Congressional Adds*	0.000	28.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	28.000

Program MDAP/MAIS Code:
Project MDAP/MAIS Code(s): 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. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	75.486	6.354	8.730	-	8.730
Current President's Budget	73.392	6.354	9.578	-	9.578
Total Adjustments	-2.094	0.000	0.848	-	0.848
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-2.094	0.000			
• Program Adjustments	0.000	0.000	0.800	-	0.800
• Rate/Misc Adjustments	0.000	0.000	0.048	-	0.048

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2016	FY 2017
Project: 9999: *Congressional Adds*		

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604454N *I (U)LX (R)*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2016	FY 2017
Congressional Add: *Accelerate LX(R)*	28.000	0.000
Congressional Add Subtotals for Project: 9999	28.000	0.000
Congressional Add Totals for all Projects	28.000	0.000

Change Summary Explanation

FY 2018 Increase of $0.8M for Enterprise Air Search Radar(EASR) Integration and an increase of $0.048M for rate and miscellaneous adjustments.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604454N / *(U)LX (R)*	Project (Number/Name) 2474 / *LX(R) Design & Total Ship Integration*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2474: *LX(R) Design & Total Ship Integration*	32.522	45.392	6.354	9.578	-	9.578	5.657	12.752	12.581	3.273	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: LX(R) DESIGN/TOTAL SHIP INTEGRATION	45.392	6.354	9.578	0.000	9.578
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Transitioned from Preliminary Design into Contract Design. This required a subsystem level of detail and most significantly a design that supports the development of a specification for a Gate 4, Gate 5, Requirement Decision Point, and System Functional Review (SFR). Began the contract design effort which is exploring innovative and cost saving concepts such as flexible infrastructure, incorporation of commonality products, and a common design environment. Shipbuilders continued to provide input to support affordability trade-offs and a producible design.					
FY 2017 Plans: 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 5, and Requirement Decision Point. Begin early Operational Assessment discussions and development of a draft Test and Evaluation Master Plan(TEMP).					
FY 2018 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604454N / *(U)LX (R)*	**Project (Number/Name)** 2474 / *LX(R) Design & Total Ship Integration*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Continue affordability initiatives to identify additional savings to absorb the one year delay to Start of Construction and achieve a Technical Data Package that aligns with the established affordability targets. Develop the documentation for a Gate 5 Review to approve the release of a draft Detailed Design and Construction (DD&C) Request for Proposal (RFP). Finalize and issue TEMP for review and approval. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	45.392	6.354	9.578	0.000	9.578

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• SCN/3010: *Amphibious Ship Replacement LX(R)*	250.000	0.000	0.000	-	0.000	0.000	1,846.058	0.000	1,713.000	0.000	3,809.058

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: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604454N / *(U)LX (R)*	Project (Number/Name) 2474 / *LX(R) Design & Total Ship Integration*

Product Development ($ in Millions)

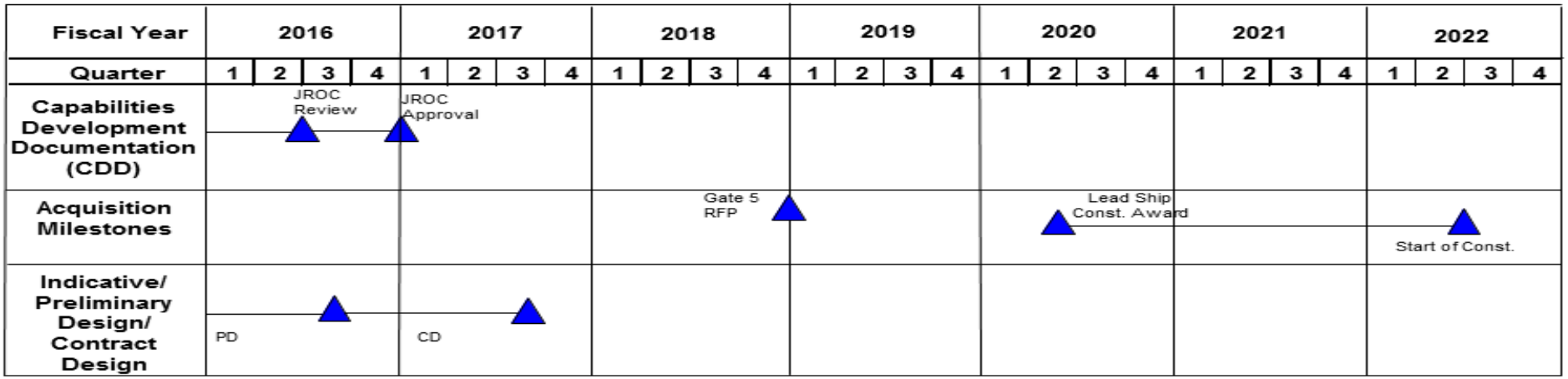
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Design/Systems Integration	C/CPIF	CSC, Alion, ICI : Washington, DC	12.062	12.500	Dec 2015	0.000		3.144	Dec 2017	-		3.144	Continuing	Continuing	Continuing
Design/Systems Integration	WR	NSWC Carderock/ SSES Philadelphia : NSWC Beth, MD/ SSES Philadelphia, PA	5.742	9.305	Nov 2015	3.001	Nov 2016	3.078	Oct 2017	-		3.078	Continuing	Continuing	Continuing
Design/Systems Integration	WR	NSWC Dahlgren : Dahlgren, VA	0.712	1.000	Nov 2015	0.689	Nov 2016	0.707	Nov 2017	-		0.707	Continuing	Continuing	Continuing
Design/Systems Integration	WR	PEO C4I, PEO IWS : Washington, DC	1.562	2.888	Nov 2015	1.906	Nov 2016	1.670	Dec 2017	-		1.670	Continuing	Continuing	Continuing
Design/Systems Integration	WR	NAWC Lakehurst : Lakehurst, NJ	0.719	0.180	Nov 2015	0.298	Nov 2016	0.404	Dec 2017	-		0.404	Continuing	Continuing	Continuing
Design/Systems Integration	C/BA	NSWC, Panama City : Panama City, FL	0.470	0.255	Nov 2015	0.240	Nov 2016	0.275	Dec 2017	-		0.275	0.000	1.240	-
Design/Systems Integration	WR	NSWC, Port Hueneme : Port Hueneme, CA	0.340	0.288	Nov 2015	0.220	Nov 2016	0.300	Dec 2017	-		0.300	Continuing	Continuing	Continuing
Design/Systems Integration	C/CPFF	HII, General Dynamics : Various	10.915	18.976	Dec 2015	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	32.522	45.392		6.354		9.578		-		9.578	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	32.522	45.392		6.354		9.578		-		9.578	-	-	-

Remarks

FY 2017 funding requirements support the continuation and completion of Contract Design (CD) efforts supporting the competitive Request for Proposal (RFP) release.

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604454N / *(U)LX (R)*	**Project (Number/Name)** 2474 / *LX(R) Design & Total Ship Integration*



*This schedule reflects a one year delay in start of construction due to a planned reduction of $236M to the FY16 Advance Procurement funding. Delivery of the Lead Ship will now be FY2026.

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604454N / *(U)LX (R)*	**Project (Number/Name)** 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	2016	1	2017
Indicative/Preliminary Design/Contract Design	1	2016	3	2017
Joint Requirements Oversight Council (JROC) CDD Review and Approval	2	2016	4	2016
Gate 5	4	2018	4	2018
RFP Release Decision Point	4	2018	4	2018
Lead Ship Construction Award	2	2020	2	2020
Lead Ship Start of Construction	2	2022	2	2022

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604454N / *(U)LX (R)*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
9999: *Congressional Adds*	0.000	28.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	28.000
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

FY16 Congressional Add to accelerate LX(R)

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017
Congressional Add: Accelerate LX(R)	28.000	0.000
FY 2016 Accomplishments: Transitioned from Preliminary Design into Contract Design. This required a subsystem level of detail and most significantly a design that supports the development of a specification for a Gate 4, Gate 5, Requirement Decision Point, and System Functional Review (SFR). Began the contract design effort which is exploring innovative and cost saving concepts such as flexible infrastructure, incorporation of commonality products, and a common design environment. Shipbuilders continued to provide input to support affordability trade-offs and informing a producible design.		
FY 2017 Plans: N/A		
Congressional Adds Subtotals	28.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

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-2, RDT&E Budget Item Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0604536N *I (U)Advanced Undersea Prototyping*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	0.000	0.000	78.589	66.543	-	66.543	106.568	160.210	87.935	44.815	Continuing	Continuing
3393: *Adv Undersea Prototyping-Remote Command & Control*	0.000	0.000	10.821	2.000	-	2.000	49.073	43.891	5.574	5.686	Continuing	Continuing
3394: *Adv Undersea Prototyping-Vehicles, Propulsion & Navigation*	0.000	0.000	57.768	61.512	-	61.512	35.943	75.244	48.752	22.799	Continuing	Continuing
3395: *Adv Undersea Prototyping-Explosive Payloads*	0.000	0.000	4.404	2.014	-	2.014	7.550	41.075	33.609	16.330	Continuing	Continuing
3396: *Adv Undersea Prototyping-Non-Lethal Payloads*	0.000	0.000	5.596	1.017	-	1.017	14.002	0.000	0.000	0.000	0.000	20.615

A. Mission Description and Budget Item Justification

Advanced undersea prototyping and test of Extra Large Unmanned Undersea Vehicles (XLUUVs) will advance the development of unmanned undersea vehicles systems by leveraging ongoing ONR and Industry UUV efforts for larger diameter vehicles. 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 formal introduction of XLUUV programs of record 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 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: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604536N *I (U)Advanced Undersea Prototyping*

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	0.000	78.589	87.844	-	87.844
Current President's Budget	0.000	78.589	66.543	-	66.543
Total Adjustments	0.000	0.000	-21.301	-	-21.301
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Program Adjustments	0.000	0.000	-21.394	-	-21.394
• Rate/Misc Adjustments	0.000	0.000	0.093	-	0.093

Change Summary Explanation

Program Changes:

FY18: -$21,301K: -$21,394K AUP Program Re-Phasing to align work scope to account for FY17 execution ; +$93K Miscellaneous Adjustments

Technical: Not applicable.

Schedule: Not applicable.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604536N / *(U)Advanced Undersea Prototyping*	Project (Number/Name) 3393 / *Adv Undersea Prototyping-Remote Command & Control*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3393: *Adv Undersea Prototyping-Remote Command & Control*	0.000	0.000	10.821	2.000	-	2.000	49.073	43.891	5.574	5.686	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Advanced Undersea energy prototyping 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 applicable to Extra Large (XL) UUVs 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. Leveraging products provided by 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Product Development	0.000	7.321	1.460	0.000	1.460
Articles:	-	-	-	-	-
FY 2016 Accomplishments: N/A					
FY 2017 Plans: Begin early stages of development of requirements and specifications that leverage existing independent research and development in energy-dense technology to meet power requirements for XLUUV missions. Begin advanced energy prototype development.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604536N / *(U)Advanced Undersea Prototyping*	**Project (Number/Name)** 3393 / *Adv Undersea Prototyping-Remote Command & Control*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Autonomy: Begin early stages of development of autonomy requirements. Begin development of maritime requirements for Undersea Command and Control (C2), begin design. ***FY 2018 Base Plans:*** Begin design of energy prototype components that leverage existing independent research and development in energy-dense technology to meet power requirements for XLUUV missions. Continue early component and Advanced Development Model system prototype development. Conduct Preliminary Design Review (PDR). Autonomy: Commence development of modeling and simulation. Continue early design efforts for Common Control System (CCS). ***FY 2018 OCO Plans:*** N/A					
Title: Support	0.000	2.750	0.390	0.000	0.390
Articles:	-	-	-	-	-
FY 2016 Accomplishments: N/A ***FY 2017 Plans:*** Support Navy technical requirements, engineering, analysis, and design necessary to utilize energy technology applicable to fleet needs for increased energy endurance and efficiency to extend reach of unmanned undersea systems. Support Navy requirements, engineering and analysis to develop autonomy and C2 for UUVs. ***FY 2018 Base Plans:*** Update program documentation as required. Update autonomy documentation and work on development of common autonomy standards, interfaces, and systems. Update CCS documentation based on domain requirements analyses. ***FY 2018 OCO Plans:***					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604536N / *(U)Advanced Undersea Prototyping*	**Project (Number/Name)** 3393 / *Adv Undersea Prototyping-Remote Command & Control*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A					
Title: Management	0.000	0.750	0.150	0.000	0.150
Articles:	-	-	-	-	-
FY 2016 Accomplishments: N/A					
FY 2017 Plans: Provide technical guidance, project planning for advanced energy prototyping. Provide financial and contracting support. Provide Coordination between prototype developer, test support, engineering, and contractors. Project planning and program management for development of UxS cross-domain common control and autonomy will begin in FY 2017. FY 2017 plans include initial cross-domain requirements analyses, schedule and cost estimate planning, and planning for advanced development, prototyping activities, and efforts associated with developing common autonomy standards, interfaces, and systems.					
FY 2018 Base Plans: Provide guidance, project planning, financial and contracting support, and coordination between prototype developer, test support, engineering, and contractors. Provide guidance, project planning, financial and contracting support, and coordination for development of common autonomy standards, interfaces, and systems.					
FY 2018 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	0.000	10.821	2.000	0.000	2.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Design Advanced Energy components to reach Preliminary Design Review in FY 2018. Develop and build advanced energy prototype and integrate system when ready. Test advanced energy prototype in FY 2021. Develop requirements, standards, interfaces, and architecture for 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 in FY20.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604536N / *(U)Advanced Undersea Prototyping*	**Project (Number/Name)** 3393 / *Adv Undersea Prototyping-Remote Command & Control*

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, 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 Common Control System software through surrogate systems.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604536N / *(U)Advanced Undersea Prototyping*	Project (Number/Name) 3394 / *Adv Undersea Prototyping-Vehicles, Propulsion & Navigation*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3394: *Adv Undersea Prototyping-Vehicles, Propulsion & Navigation*	0.000	0.000	57.768	61.512	-	61.512	35.943	75.244	48.752	22.799	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Advanced undersea prototyping and test of Extra Large Unmanned Undersea Vehicle Systems (XLUUVs) will advance the development of unmanned undersea vehicles by leveraging existing 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 formal introduction of XLUUV programs of record 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 meet power requirements for XLUUV missions that are limited by the amount of power currently available. Efforts under this program element 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.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: XLUUV Product Development	0.000	52.250	55.322	0.000	55.322
Articles:	-	-	-	-	-
Description: XLUUV is being developed via a full and open competition of up to two industry teams to design systems (with down select to one team to fabricate).					
FY 2016 Accomplishments: N/A					
FY 2017 Plans: Develop Statement of Work (SOW), Request for Proposal (RFP) and Performance Specifications for XLUUV. Release RFP, conduct source selection and award contract.					
FY 2018 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604536N / *(U)Advanced Undersea Prototyping*	**Project (Number/Name)** 3394 / *Adv Undersea Prototyping-Vehicles, Propulsion & Navigation*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Manage up to two industry teams designing XLUUV, conduct System Requirements Review (SRR) and Preliminary Design Review (PDR). Lease Commercial Off the Shelf (COTS) UUVs to develop Tactics, Techniques, and Procedures (TTPs). ***FY 2018 OCO Plans:*** N/A					
Title: XLUUV Support ***Articles:*** ***FY 2016 Accomplishments:*** N/A ***FY 2017 Plans:*** Develop RFP, performance specifications and award up to two contracts. ***FY 2018 Base Plans:*** Manage up to two industry teams to design XLUUV. Oversee COTS leasing. ***FY 2018 OCO Plans:*** N/A	0.000 -	5.000 -	4.860 -	0.000 -	4.860 -
Title: XLUUV Management Services ***Articles:*** ***FY 2016 Accomplishments:*** N/A ***FY 2017 Plans:*** 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. ***FY 2018 Base Plans:*** 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. ***FY 2018 OCO Plans:*** N/A	0.000 -	0.518 -	1.330 -	0.000 -	1.330 -
Accomplishments/Planned Programs Subtotals	0.000	57.768	61.512	0.000	61.512

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604536N / *(U)Advanced Undersea Prototyping*	**Project (Number/Name)** 3394 / *Adv Undersea Prototyping-Vehicles, Propulsion & Navigation*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Up to five XLUUV systems will be fabricated for demonstration both CONUS and in the PACOM theater. Payloads developed under projects 3394 and 3395 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 FY 2018. Design contract(s) [up to two] for the XLUUV system is targeted for award in FY 2017.

E. Performance Metrics

Successfully demonstrate XLUUV with Fleet.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604536N / *(U)Advanced Undersea Prototyping*	**Project (Number/Name)** 3394 / *Adv Undersea Prototyping-Vehicles, Propulsion & Navigation*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Payload Design documentation	C/CPIF	Various : Various	0.000	0.000		0.250	Jun 2017	2.440	Nov 2017	-		2.440	Continuing	Continuing	Continuing
Fabrication of up to 5 XLUUVs, battery energy section, Mine warfare payload	C/CPIF	Various : Various	0.000	0.000		52.000	Sep 2017	52.882	Jan 2018	-		52.882	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		52.250		55.322		-		55.322	-	-	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
RFP/PSPED Dev	SS/CPFF	APL/JHU : Laurel, MD	0.000	0.000		2.100	Jul 2017	0.000		-		0.000	0.000	2.100	-
Source Selection	WR	NSWC CD : Carderock, MD	0.000	0.000		1.500	Jun 2017	0.000		-		0.000	0.000	1.500	-
Source Selection	WR	SSC PAC : San Diego, CA	0.000	0.000		1.400	Jun 2017	0.000		-		0.000	0.000	1.400	-
Tech Oversight of Design	Various	VAR : Variouus	0.000	0.000		0.000		4.860	Mar 2018	-		4.860	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		5.000		4.860		-		4.860	-	-	-

Management Services ($ in Millions)

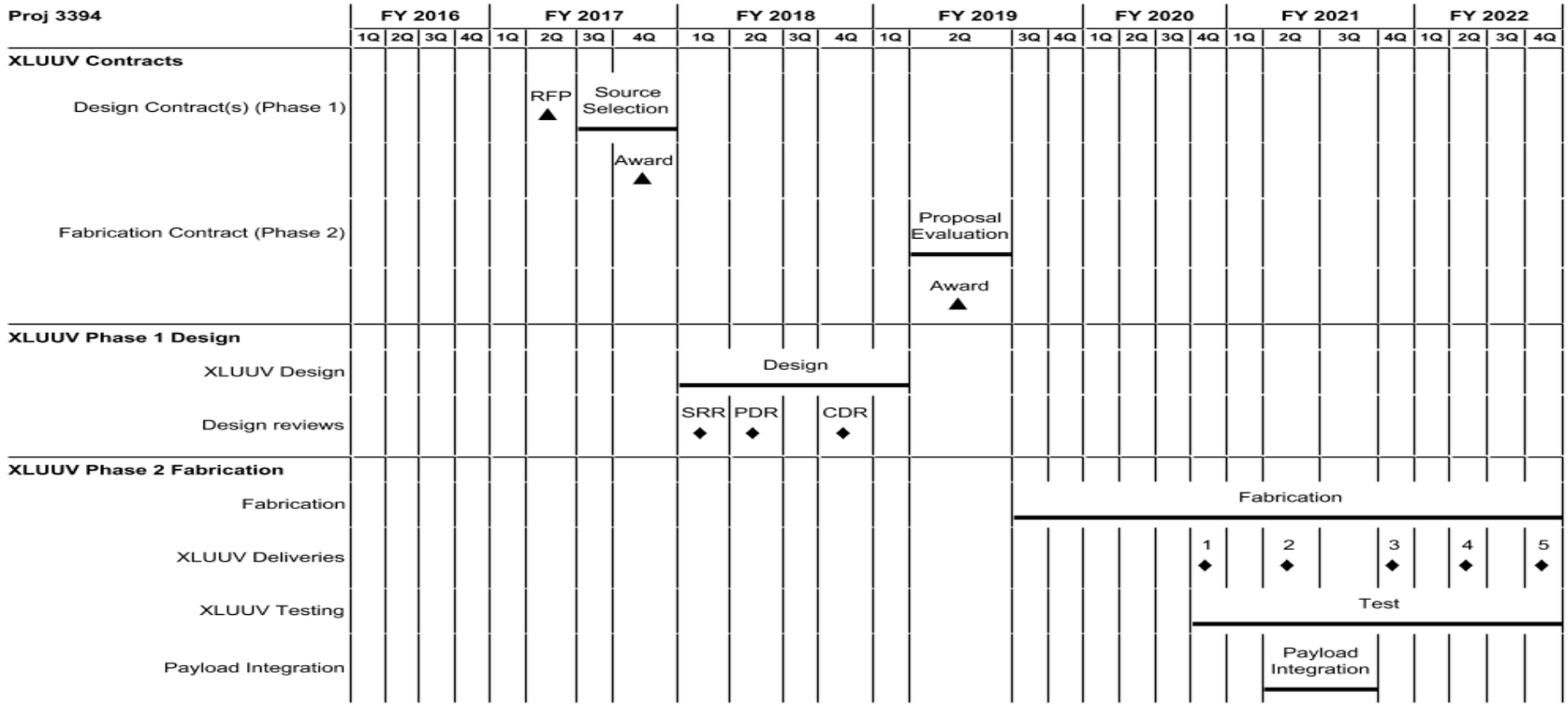
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Techncal support	WR	NSWC : WASHINGTON, D.C.	0.000	0.000		0.518	Jun 2017	1.330	Oct 2017	-		1.330	3.000	4.848	-
		Subtotal	0.000	0.000		0.518		1.330		-		1.330	3.000	4.848	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604536N / *(U)Advanced Undersea Prototyping*	Project (Number/Name) 3394 / *Adv Undersea Prototyping-Vehicles, Propulsion & Navigation*	

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		57.768		61.512		-		61.512	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604536N / *(U)Advanced Undersea Prototyping*	**Project (Number/Name)** 3394 / *Adv Undersea Prototyping-Vehicles, Propulsion & Navigation*



2018PB - 0604536N - 3394

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604536N / *(U)Advanced Undersea Prototyping*	**Project (Number/Name)** 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	2	2019	2	2019
XLUUV Contracts: Fabrication Contract (Phase 2): Contract Award	2	2019	2	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	4	2018	4	2018
XLUUV Phase 2 Fabrication: Fabrication: Fabrication	3	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	3	2021

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604536N / *(U)Advanced Undersea Prototyping*	Project (Number/Name) 3395 / *Adv Undersea Prototyping-Explosive Payloads*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3395: *Adv Undersea Prototyping-Explosive Payloads*	0.000	0.000	4.404	2.014	-	2.014	7.550	41.075	33.609	16.330	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

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 the both undersea and surface targets. New C2 algorithms will be developed for advanced targeting.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Explosive Payloads	0.000	4.404	2.014	0.000	2.014
Articles:	-	-	-	-	-
FY 2016 Accomplishments: N/A					
FY 2017 Plans: Concept design for XLUUV undersea weapons payload and performance and lethality analysis.					
FY 2018 Base Plans: Continue concept design for XLUUV undersea weapons payload and performance and lethality analysis. Initiate the initial development of XLUUV Undersea weapons payload.					
FY 2018 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	0.000	4.404	2.014	0.000	2.014

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604536N / *(U)Advanced Undersea Prototyping*	**Project (Number/Name)** 3395 / *Adv Undersea Prototyping-Explosive Payloads*

D. Acquisition Strategy

Leverage the knowledge base at the Naval Research and Development Enterprise to complete the feasibility studies that will then lead 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 weapon from an XLUUV.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604536N / *(U)Advanced Undersea Prototyping*	Project (Number/Name) 3396 / *Adv Undersea Prototyping-Non-Lethal Payloads*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3396: *Adv Undersea Prototyping-Non-Lethal Payloads*	0.000	0.000	5.596	1.017	-	1.017	14.002	0.000	0.000	0.000	0.000	20.615
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Advanced Undersea prototyping will experiment and demonstrate non-lethal payloads on XLUUVs. XLUUV are UUVs that are normally greater than 54" in diameter and have long range and endurance. 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Non Lethal Payloads	0.000	5.596	1.017	0.000	1.017
Articles:	-	-	-	-	-
FY 2016 Accomplishments: N/A					
FY 2017 Plans: Commence the technology study to inform the design of the non-lethal payload as well as preliminary design efforts.					
FY 2018 Base Plans: Complete the initial study and continue detailed design efforts for the non-lethal payloads of the XLUUVs.					
FY 2018 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	0.000	5.596	1.017	0.000	1.017

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604536N / *(U)Advanced Undersea Prototyping*	**Project (Number/Name)** 3396 / *Adv Undersea Prototyping-Non-Lethal Payloads*

D. Acquisition Strategy

A technology study 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 FY17 for preliminary efforts with main efforts occurring after the study is completed. The payload will be integrated and demonstrated on the XLUUV.

E. Performance Metrics

Kinetic payload integrated onto an XLUUV. Detailed metrics are classified.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604653N *I JT Cntr Radio Controlled IED Elec War (JCREW)*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	228.591	3.765	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	232.356
3177: *Joint Counter Radio-Controlled IED Elec Warfare*	228.591	3.765	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	232.356

A. Mission Description and Budget Item Justification

Provides for the research and development of 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 Joint CREW development of equipment, procedures, and tactical aids to make rapid improvements to performance, supportability and affordability, while maintaining pace with an evolving global threat.

PE 0604653N consolidated into PE 0603654N FY 2017 and out.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	3.790	0.000	0.000	-	0.000
Current President's Budget	3.765	0.000	0.000	-	0.000
Total Adjustments	-0.025	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.025	0.000			
• Rate/Misc Adjustments	0.000	0.000	0.000	-	0.000

Change Summary Explanation

PE 0604653N consolidated into PE 0603654N FY 2017 and out.

Technical: Not applicable.

Schedule: Not applicable.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604653N / *JT Cntr Radio Controlled IED Elec War (JCREW)*	Project (Number/Name) 3177 / *Joint Counter Radio-Controlled IED Elec Warfare*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3177: *Joint Counter Radio-Controlled IED Elec Warfare*	228.591	3.765	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	232.356
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Provides for the research and development of 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. Utilizes Joint requirements to provide a System of Systems (SoS) approach for a suite of equipment for mounted, dismounted, and fixed site operations; provides for Joint Counter Radio Controlled Improvised Explosive Device Electronic Warfare (JCREW) system development and equipment, procedures, and tactical aids to make rapid improvements to performance, supportability and affordability, while maintaining pace with an evolving global threat.

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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Joint Counter Radio-Controlled IED Elec Warfare	3.765	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: Supports the effort required for the design, engineering, development, fabrication and test of contractor's development models for in-house verification and validation for governmental developmental testing for JCREW System of Systems (SoS) to include the Engineering Manufacturing and Development (EMD) Phase. The JCREW SoS approach includes three distinct capabilities that shall be developed and will utilize common component, software, and hardware solutions for an open, flexible, and compatible system design approach that is modular. These capabilities are: mobile dismounted operations, mobile ground, combat systems (mounted) and semi-permanent geographical area (fixed) systems.					
FY 2016 Accomplishments:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604653N / *JT Cntr Radio Controlled IED Elec War (JCREW)*	**Project (Number/Name)** 3177 / *Joint Counter Radio-Controlled IED Elec Warfare*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Initiate Technology Refresh and transition of technologies developed under ONR Technology Transition Agreements (TTAs). ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	3.765	0.000	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• OPN/5509: *Explosive Ordnance Disposal Equip*	2.929	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	214.325

Remarks

PE 0604653N consolidated into PE 0603654N FY17 and out.

D. Acquisition Strategy

FY15 LRIP will support IOC, setup and maintain warm Production Line and OEM Depot Line until FRP decision in FY16. FRP Production Line Start Up and Ramp Up and FRP Organic Depot Line Startup and Ramp Up in FY17. 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.

E. Performance Metrics

LRIP contract awarded September 2015. Validated Technical Data Package (TDP) for Full Rate Production (FRP). Request for Proposal (RFP) will release in July 2016.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604659N *I (U)Precision Strike Weapons Development Program*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	0.000	7.621	9.910	31.315	-	31.315	118.830	107.212	108.545	119.712	Continuing	Continuing
3378: *Next Generation Land Attack Weapon (NGLAW)*	0.000	7.621	9.910	9.994	-	9.994	16.866	49.286	91.658	109.844	Continuing	Continuing
3407: *Air Launched Decoy Development*	0.000	0.000	0.000	21.321	-	21.321	101.964	57.926	16.887	9.868	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 (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.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604659N *I (U)Precision Strike Weapons Development 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	9.595	9.910	45.088	-	45.088
Current President's Budget	7.621	9.910	31.315	-	31.315
Total Adjustments	-1.974	0.000	-13.773	-	-13.773
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.905	0.000			
• SBIR/STTR Transfer	-0.069	0.000			
• Program Adjustments	0.000	0.000	-13.471	-	-13.471
• Rate/Misc Adjustments	0.000	0.000	-0.302	-	-0.302

Change Summary Explanation

The FY 2018 funding request was reduced by $2.871 million to account for the availability of prior year execution balances.

NGLAW funding was realigned to support the updated AoA timeline.

Schedule: PU 3378

The NGLAW Initial Capabilities Document (ICD) was approved in 4QFY2016.

Analysis of Alternatives (AoA) changed from 2Q FY 2016 - 2Q FY 2018 to 1Q FY 2017 - 2Q FY 2018 as a result of ICD approval moved to 4Q FY2016.

Schedule: PU 3407
FY 2018 will transition MALD from a Strategic Capabilities Office (SCO) Demonstration to a Navy program of record. This is not a new start.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604659N / *(U)Precision Strike Weapons Development Program*	Project (Number/Name) 3378 / *Next Generation Land Attack Weapon (NGLAW)*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3378: *Next Generation Land Attack Weapon (NGLAW)*	0.000	7.621	9.910	9.994	-	9.994	16.866	49.286	91.658	109.844	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Next Generation Land Attack Weapon (NGLAW)	7.621	9.910	9.994	0.000	9.994
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Completion of the Capabilities Based Assessment (CBA) and Initial Capabilities Document (ICD). Establishment of the security environment for conduct of the AoA.					
FY 2017 Plans: Conduct 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 and cost. Conduct threat assessments based on current and future scenarios and environments to inform performance requirements and relevant technology. Additionally, these technologies will be assessed for their maturity and applicability to fielded and future weapons to address expanded target sets to include mobile and moving land/maritime targets. Results of the analysis will inform the requirement and acquisition approach to deliver an affordable, long term Strike Weapon.					
FY 2018 Base Plans: 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,					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604659N / *(U)Precision Strike Weapons Development Program*	**Project (Number/Name)** 3378 / *Next Generation Land Attack Weapon (NGLAW)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
and cost. Complete threat assessments based on current and future scenarios and environments to inform performance requirements and relevant technology. Conduct sufficiency review and conduct Gate Reviews. Complete limited Technology Maturation Risk Reduction (TMRR) baseline assesment of the critical technologies identified by the AoA that require future investment to mature to a Technology Readiness Level (TRL) 6. Utilize both Government Field Activities and Industry partners to conduct TMRR. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	7.621	9.910	9.994	0.000	9.994

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Acquisition strategy will be influenced by the output of the AoA and the Material Development Decision (MDD).

E. Performance Metrics

Conduct NGLAW AoA.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604659N / *(U)Precision Strike Weapons Development Program*	Project (Number/Name) 3407 / *Air Launched Decoy Development*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3407: *Air Launched Decoy Development*	0.000	0.000	0.000	21.321	-	21.321	101.964	57.926	16.887	9.868	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 4Q17.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Miniature Air Launched Decoy (MALD)	0.000	0.000	21.321	0.000	21.321
Articles:	-	-	-	-	-
FY 2016 Accomplishments: N/A					
FY 2017 Plans: N/A					
FY 2018 Base Plans: Begin Engineering, Manufacturing, and Development phase activities. 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					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604659N / *(U)Precision Strike Weapons Development Program*	**Project (Number/Name)** 3407 / *Air Launched Decoy Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
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 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.000	0.000	21.321	0.000	21.321

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 0204162N/2285: *Drones and Decoys*	0.000	0.000	0.000	-	0.000	5.800	26.399	32.799	47.099	Continuing	Continuing

Remarks

D. Acquisition Strategy

Research and development performed by contractor and government staff.

E. Performance Metrics

Complete staffing of CDD.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604659N / *(U)Precision Strike Weapons Development Program*	Project (Number/Name) 3407 / *Air Launched Decoy Development*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	SS/CPFF	Raytheon : Tucson, AZ	0.000	0.000		0.000		14.315	Mar 2018	-		14.315	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		14.315		-		14.315	-	-	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Support	WR	NAWC AD : Patuxent River, MD	0.000	0.000		0.000		2.000	Oct 2017	-		2.000	Continuing	Continuing	Continuing
Government Support	WR	NAWC WD : China Lake, CA	0.000	0.000		0.000		4.000	Oct 2017	-		4.000	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		6.000		-		6.000	-	-	-

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Support	WR	NAWC AD : Patuxent River, MD	0.000	0.000		0.000		0.500	Oct 2017	-		0.500	Continuing	Continuing	Continuing
Government Support	WR	NAWC WD : China Lake, CA	0.000	0.000		0.000		0.256	Oct 2017	-		0.256	Continuing	Continuing	Continuing
Project Management Support	C/CPFF	NAWC AD : Patuxent River, MD	0.000	0.000		0.000		0.200	Mar 2018	-		0.200	Continuing	Continuing	Continuing
Travel	Various	NAVAIR : Patuxent River, MD	0.000	0.000		0.000		0.050	Oct 2017	-		0.050	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		1.006		-		1.006	-	-	-

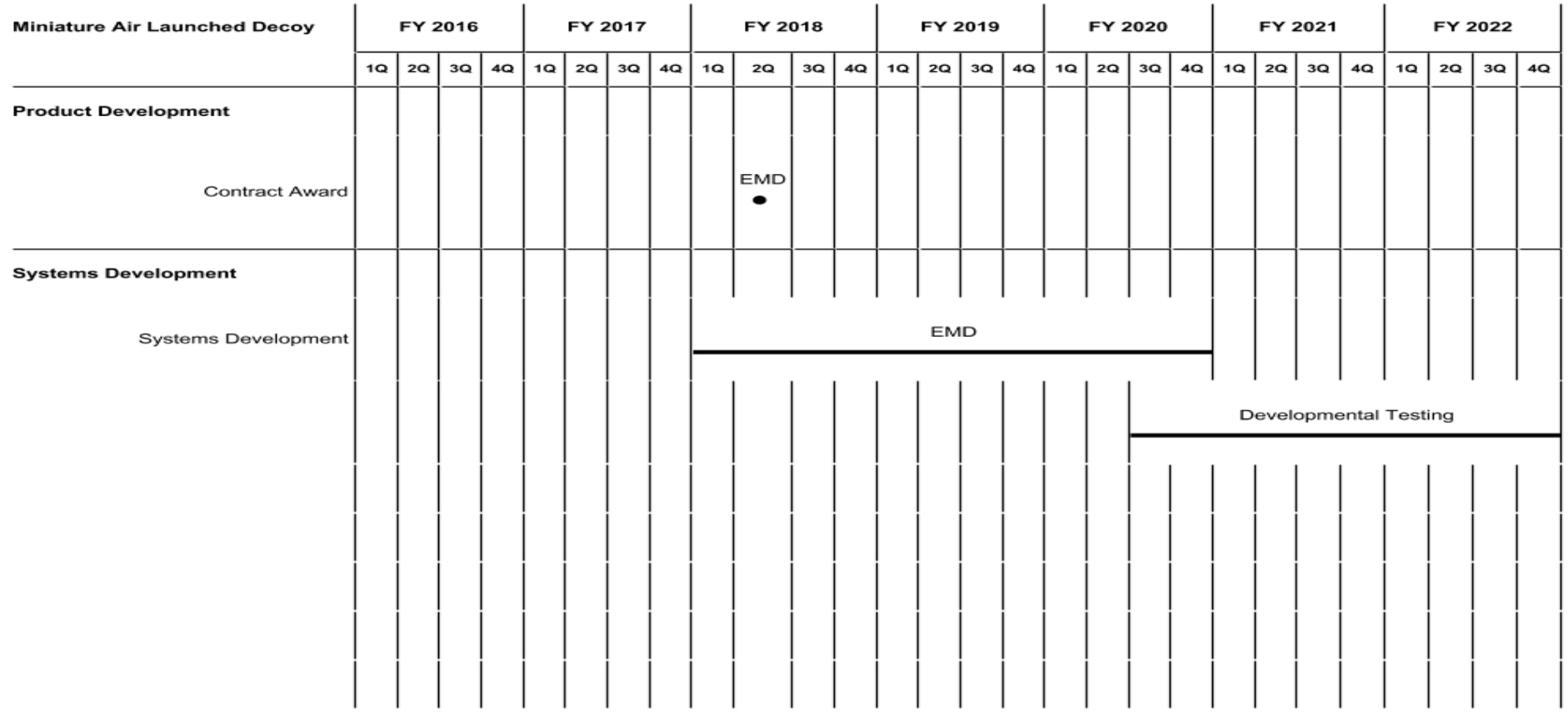
	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		0.000		21.321		-		21.321	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604659N / *(U)Precision Strike Weapons Development Program*	Project (Number/Name) 3407 / *Air Launched Decoy Development*	

	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604659N / *(U)Precision Strike Weapons Development Program*	**Project (Number/Name)** 3407 / *Air Launched Decoy Development*



2018OSD - 0604659N - 3407

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604659N / *(U)Precision Strike Weapons Development Program*	**Project (Number/Name)** 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: EMD Contract Award	2	2018	2	2018
Systems Development: Systems Development: Engineering and Manufacturing Development	1	2018	4	2020
Systems Development: Systems Development: Developmental Testing	3	2020	4	2022

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0604707N / *SEW Architecture/Eng Support*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	301.307	22.214	23.971	42.851	-	42.851	32.518	27.971	27.857	39.203	Continuing	Continuing
0798: *Allied/Coalition Interoperability and Information Dominance (ACIID)*	31.966	0.642	0.953	1.096	-	1.096	1.076	1.094	1.012	1.032	Continuing	Continuing
2144: *Space & Elec Warfare Engineering*	199.406	9.761	13.175	33.716	-	33.716	22.408	16.843	15.927	27.034	Continuing	Continuing
2147: *ISR Architecture*	0.000	0.000	1.523	1.587	-	1.587	1.583	1.584	1.585	1.617	Continuing	Continuing
2356: *Maritime Concept Generation & Development*	19.141	3.268	8.320	6.452	-	6.452	7.451	8.450	9.333	9.520	Continuing	Continuing
3319: *Fleet Experimentation*	50.794	8.543	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	59.337

A. Mission Description and Budget Item Justification

This Program Element (PE) includes the following projects: Maritime Concept Generation and Development (CGCD), Allied/Coalition Interoperability and Information Dominance (ACIID), Fleet Experimentation, Intelligence, Surveillance, and Reconnaissance (ISR) Architecture and Space and Electronic Warfare (SEW) Engineering.

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 FY2018 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 and SEW Engineering projects (0798 and 2144 respectively) are systems engineering non-acquisition programs to develop, test, implement Technical Authority (TA), 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 operational environments. The objectives of these projects are carried out by multiple tasks that ensure development and delivery of naval Information Warfare (IW) capabilities that are well-integrated, interoperable, secure, and resilient. These projects also ensure: (1) the combined operational capabilities of SEW systems conform to applicable integrated architectures, and associated specifications and standards, intended to drive the interoperability and cybersecurity of capabilities for validated warfighting requirements; (2) Program Executive Office Command, Control, Communications, Computers, Intelligence (PEO C4I) Programs of Record (PoR) cybersecurity test requirements are evaluated by the cybersecurity vulnerability and functional test capability of the C4I components of the USS Secure laboratory. (3) development of technical guidance (architectures, specifications, and standards) to implement a single integrated Navy plan for cyber; (4) SEW systems and systems integration efforts involve innovative technology insertion methodologies to reduce timeline and costs for development and delivery of operational capability.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604707N *I SEW Architecture/Eng Support*

The 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 Information Environment (JIE) and Intelligence Community (IC) Information Technology Environment (ITE). As tasked by the Navy's ISR Council, 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.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	20.203	23.971	25.233	-	25.233
Current President's Budget	22.214	23.971	42.851	-	42.851
Total Adjustments	2.011	0.000	17.618	-	17.618
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	2.599	0.000			
• SBIR/STTR Transfer	-0.588	0.000			
• Program Adjustments	0.000	0.000	17.324	-	17.324
• Rate/Misc Adjustments	0.000	0.000	0.294	-	0.294

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604707N / *SEW Architecture/Eng Support*	Project (Number/Name) 0798 / *Allied/Coalition Interoperability and Information Dominance (ACIID)*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0798: *Allied/Coalition Interoperability and Information Dominance (ACIID)*	31.966	0.642	0.953	1.096	-	1.096	1.076	1.094	1.012	1.032	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Allied/Coalition Interoperability and Information Dominance (ACIID) 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 ACIID 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 Network (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 Limited 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Advanced Relay Capabilities	0.642	0.953	1.096	0.000	1.096
Articles:	-	-	-	-	-
FY 2016 Accomplishments:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604707N / *SEW Architecture/Eng Support*	**Project (Number/Name)** 0798 / *Allied/Coalition Interoperability and Information Dominance (ACIID)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Continued the development and refinement of advanced networking and communication capabilities that promoted Allied interoperability, task group-centric operations in SATCOM-Restricted and SATCOM-Denied environments, and supported the defeat of Anti-Access Area Denial (A2/AD). Solutions addressed higher bandwidth technologies across the Radio Frequency (RF) and Optical spectrum, such as wide-band High Frequency (HF), Ultra High Frequency (UHF), and other high-data rate wireless technologies. - Developed and assessed secure and interoperable multi-bearer routing, distributed application and service architectures and advanced Information Assurance/Computer Network Defense (IA/CND) solutions that support tactical networking and A2/AD requirements. Continued the overarching goal to maximize interoperability and network efficiency using multiple, dissimilar bearers and integrated these advanced solutions into an Allied/ Coalition tactical networking environment that will defeat A2/AD. - Continued to progress the standardization and operationalization of North Atlantic Treaty Organization (NATO) Maritime Relayed Line of Sight Network Standardization Agreements (STANAG 4691) and HF Internet Protocol (STANAG 5066 Edition 3). - Increased Allied Information Warfare (IW) interoperability with other joint and maritime multi-national forums, such as the Combined Communications Electronics Board (CCEB), Multinational Maritime Information-system Interoperability Steering Group (M2I2), Mission Partner Environment (MPE), Future Mission Network (FMN), and the Joint Information Environment (JIE) forums. - Venues of opportunity, such as Fleet Experimentation (FLEX), were exploited to assess and validate the individual technologies, integrated solutions, and associated Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel and Facilities (DOTMLPF) through limited experimentation, trials, and demonstrations with Australia, Canada, New Zealand, United Kingdom, United States (AUSCANNZUKUS) and other Allied/Coalition partners.					
FY 2017 Plans: - Develop and refine advanced networking and communication capabilities that counter A2/AD environments 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. - Develop and assess secure and interoperable technologies and capabilities that counter A2/AD environments, to include multi-bearer routing, MPE/FMN architectures that support distributed applications and service architectures, the use of cross-domain and data labeling solutions in maritime tactical networking environments (e.g. the U.S. Battlefield Information Collection and Exploitation System - extended (BICES-X) Trusted Network Engine, or TNE) and advanced IA/CND solutions. The overarching goal is to maximize interoperability and					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604707N / *SEW Architecture/Eng Support*	**Project (Number/Name)** 0798 / *Allied/Coalition Interoperability and Information Dominance (ACIID)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
network and application efficiency using multiple, dissimilar bearers and integrate these advanced solutions into an Allied/Coalition networking capability capable of countering A2/AD environments and integrated with MPE/ FMN architectures. - Assess the U.S. Battlefield Information Collection and Exploitation System - extended (BICES-X) technologies and associated interoperability issues in Satellite Communications (SATCOM) denied or degraded environments. - 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), Mission Partner Environment (MPE), Future Mission Network (FMN), and Joint Information Environment (JIE) forums. - 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 RIMPAC or Joint Warrior.					
FY 2018 Base Plans: - Continue refinement of advanced tactical networking and communication capabilities that facilitate Denied, Degraded, Intermittent and Low-bandwidth (DDIL) operations, 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. - Develop and assess secure and interoperable technologies and capabilities supporting DDIL operations, to include multi-bearer routing, distributed applications and services for 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. - Assess the BICES-X technologies and associated interoperability issues in DDIL environments. - Increase Allied IW interoperability with other joint and maritime multi-national forums, such as the CCEB, M2I2, MPE, FMN, and JIE forums.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604707N / *SEW Architecture/Eng Support*	**Project (Number/Name)** 0798 / *Allied/Coalition Interoperability and Information Dominance (ACIID)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Assess and validate individual technologies, integrated solutions, and associated DOTMLPF through experimentation, trials and demonstrations with AUSCANNZUKUS and other Allied/Coalition partners during operational venues such as RIMPAC or Joint Warrior. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.642	0.953	1.096	0.000	1.096

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Allied/Coalition Interoperability and Information Dominance (ACIID) is a non-acquisition program that promotes United States Navy (USN) 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 ACIID program will employ laboratory testing and at-sea demonstrations to assess specific technologies, operational concepts, and integrated Doctrine, Organization, Training, Material, Leadership, Personnel and Facilities (DOTMLPF) solutions pertaining to Anti-Access Area Denial (A2/AD) environments, Network Operations Without Shore (NOWS), Maritime Domain Awareness (MDA), Mission Partner Environment (MPE)/Future Mission Networks (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-2A, RDT&E Project Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319 / 4					R-1 Program Element (Number/Name) PE 0604707N / *SEW Architecture/Eng Support*				Project (Number/Name) 2144 / *Space & Elec Warfare Engineering*			
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
2144: *Space & Elec Warfare Engineering*	199.406	9.761	13.175	33.716	-	33.716	22.408	16.843	15.927	27.034	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Planned Program titles changed as follows:
-Cybersecurity Architecture, Specifications and Standards (formerly known as Systems Engineering Standards and Processes)
-Enterprise Architecture (formerly known as Systems Engineering and Integration Revitalization)
-Systems Command (SYSCOM) Systems Engineering (formerly known as Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) Systems Engineering)

A. Mission Description and Budget Item Justification

Fiscal Year (FY) 2018 funding increase is to establish the Command, Control, Communications, Computers, Intelligence (C4I) suite capabilities to provide a cybersecurity vulnerability and functional test capability within the USS Secure test laboratory.

Office of the Secretary of Defense (OSD) has defined several key programs, initiatives, and policies that drive Navy requirements prioritization and impact Navy Programs of Record (PoR). Major efforts include Joint Information Environment (JIE), the Intelligence Community Information Technology Environment (IC ITE) and the Risk Management Framework (RMF). The Navy has made a number of modifications to account for emerging threats in cyber and address the need for greater interoperability to support key warfighting missions.

Additionally, the Navy has defined Information Warfare (IW) objectives for Assured Command and Control (C2), Battlespace Awareness, Integrated Fires (IF), and Cyber capabilities that require significant changes and improvements to the Navy's approach for managing its information infrastructure, content, and effects. Potential adversaries will exploit perceived United States (U.S.) space and cyberspace vulnerabilities, which could impact U.S. information-handling capabilities and wartime readiness.

The Navy has identified Space and Naval Warfare Systems Command (SPAWAR) as responsible for Information Technology (IT) Technical Authority (TA), Information Assurance (IA) TA and lead for a cross-SYSCOM Technical Authority Board (TAB) to develop, monitor and approve architectures, technical standards, tools and processes that form the technical foundation of a single, integrated Navy plan for cybersecurity.

USS Secure is a cyber assessment program within the Naval Research and Development Establishment (NR&DE). This cross-SYSCOM, cross-domain, System of Systems (SoS) (Afloat, Aloft, C4I & Shore) capability in a test laboratory environment provides a rapidly re-configurable capability that can integrate real maritime hardware systems into a virtual complete platform for platform level SoS cybersecurity research, development, test and evaluation, and training, not otherwise possible.

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This combination of SYSCOM laboratories, cyber ranges, and Red Teams more accurately simulating Navy platforms in operational maritime environments is critical for effectively evaluating cyber threats against specified mission threads.

The cybersecurity vulnerability and functional test capability will support Program Executive Office Command, Control, Communications, Computers, Intelligence (PEO C4I) Programs of Record (PoR) cybersecurity test requirements and the C4I components of the USS Secure. This capability will provide a System of Systems (SoS) cyber test and assessment capability and facilitate the programs' compliance with both Department of Defense (DoD) (e.g. Risk Management Framework (RMF)) and Department of Navy (DoN) cybersecurity Test and Evaluation (T&E) policy, directives and requirements. This effort includes establishing and designing the capability to test operationally representative C4I baselines, to include force level platforms, unit level platforms, and associated shore services and transport capabilities. It will provide C4I enclave support to USS Secure enabling cyber assessments of systems and enclaves in an end-to-end environment. This program will include Red Team testing, Mission-thread Analysis, cyber risk assessments, and cyber base lining. Since no Objective Quality Evidence (OQE) of potential cyber threats on mission threads and C4I systems exists, this testing will prepare PoRs to meet and address acquisition milestones, Key Performance Parameters (KPPs), and test objectives.

The engineering artifacts developed through the Technical Authority Board (TAB) provide Navy-specific guidance that facilitates common and consistent implementation of security controls across current and future Navy PoRs and eliminate redundancies and inefficiencies characteristic of previous stove-pipe development efforts in which each system addressed security individually. These efforts enable a standardized and layered, Defense-in-Depth approach to improving the Navy's cybersecurity posture. This enables some Navy programs to inherit required security controls from other systems, thereby reducing their cybersecurity requirements and associated integration costs. The cybersecurity standards also support effective transition from Department of Defense Information Assurance Certification and Accreditation Process (DIACAP) to RMF.

To realize the Information Warfare (IW) vision, the Navy will develop Information Technology (IT) and Information Assurance (IA) Technical Authority (TA) architectures, specifications, standards, and profiles to ensure Navy cyber capabilities can support critical warfighting functions in degraded or contested environments.

To support Navy objectives in advancing IW capabilities, the Space and Electronic Warfare (SEW) provides four main functions:
(1) Develop the architectures, specifications and standards to support a single integrated Navy plan for cybersecurity;
(2) Provide the cybersecurity vulnerability and functional test capability which supports cybersecurity test requirements and the C4I components of the USS Secure.
(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 IT, and Space System capabilities; and
(4) Drive rigorous Systems Engineering discipline to support rapid development and delivery of secure and interoperable C4ISR, Business IT, and Space Systems capabilities that meet Fleet requirements.

Products provided:
1) Integrated architectures, specifications and standards to reflect current (as-is) and future (target) end states to support technical analyses, program planning, and enterprise-level investment decisions across current and future C4ISR, Business IT, and Space System capabilities.
- Defense-in-Depth cybersecurity architectures and standards derived from National Institute of Standards and Technology (NIST) requirements and tailored for Navy-specific implementation in combat/weapon system, Naval control system, Business IT, and C4I programs across all of the Navy Systems Commands.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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- Fit for Purpose / Department of Defense Architecture Framework (DoDAF) compliant architecture views to support PoR Engineering/Acquisition documentation requirements and ensure alignment with applicable Joint Information Environment (JIE), Intelligence Community Information Technology Environment (IC ITE), Space and Naval Warfare Systems Command (SPAWAR) Enterprise Architecture, and other higher-level architectures.
2) Engineering tools and processes that support and drive consistent application of technical rigor across all design, development, validation and certification activities for C4ISR, Business IT, and Space IW systems.
- Single, authoritative repository to maintain validated engineering artifacts with associated technical performance attributes to support advanced model-based engineering analyses and studies.
- Development and refinement of model-based systems engineering tools to support mission thread driven analysis enabling the identification of capability gaps and overlaps, interoperability issues, and cybersecurity vulnerabilities between Navy System of Systems (SoS) capabilities.
- Initial planning and procurement to establish cybersecurity test capabilities and the Command, Control, Communications, Computers, Intelligence (C4I) components of the USS Secure, a cross-Systems Command (SYSCOM) distributed Cyber test capability in support of cybersecurity testing.
- Systems Engineering Technical Reviews (SETRs) to provide independent, objective assessments of the technical maturity and compliance with applicable architectures, specifications and standards for Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR), Business Information Technology (IT), and Space Systems.
- End-to-End Systems Engineering and Integrated Design - Operational feasibility studies, technical feasibility studies, technical roadmap engineering validations, architectures, and assessment traceability matrices.
- Engineering Evaluations to ensure delivered C4ISR, Business IT, and Space Systems are validated as meeting operational needs and interoperability requirements.
- Technical analysis and engineering artifacts to ensure integration and interoperability across Assured Command and Control (C2), Battlespace Awareness, and Integrated Fires (IF) to deliver integrated Information Warfare (IW) capabilities to Navy warfighters.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Cybersecurity Architecture, Specifications and Standards (Formerly known as Systems Engineering Standards and Processes)	5.527	8.250	7.931	0.000	7.931
Articles:	-	-	-	-	-
FY 2016 Accomplishments: - Developed Aviation and Ashore domain instantiations of the Defense-in-Depth Functional Implementation Architecture (DFIA). Space and Naval Warfare Systems Command (SPAWAR) completed three (3) of the five (5) DFIA instantiations directed by the Technical Authority Board (TAB). - Developed and coordinated IT/Information Assurance (IA) TAB endorsement on seven (7) cybersecurity standards. SPAWAR completed 14 of the 39 foundational standards identified by the TAB. - Continued IT/IA Technical Authority (TA) efforts to define, place under configuration control, and manage physical and logical interface requirements and IA controls for systems that connect to the Navy Enterprise Network.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604707N / *SEW Architecture/Eng Support*	**Project (Number/Name)** 2144 / *Space & Elec Warfare Engineering*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Developed Navy Cybersecurity Situational Awareness (NCSA) requirements and interface specifications and standards; performed risk assessments to improve NCSA decision-making regarding the protection, detection, and response to cyber events on Navy networks and systems. - Carried forward efforts to leverage existing processes (e.g., SETR, Gate Reviews, etc.) to ensure Acquisition Category (ACAT) programs compliance with IT and IA TA specifications, standards and profiles. - Continued development of technical artifacts, including design documentation, to inform Navy Enterprise Network target end state activities while ensuring alignment with broader Department of Defense (DoD) Enterprise initiatives (e.g., Joint Information Environment (JIE), Intelligence Community Information Technology Environment (IC ITE)). - Initiated work to develop a common repository to serve as the authoritative source of Information Technology (IT) Technical Authority (TA) and Information Assurance (IA) TA architectures, specifications, standards and profiles.					
FY 2017 Plans: - Develop Space domain and Enterprise instantiations of the Defense-in-depth Functional Implementation Architecture (DFIA). Completion of these artifacts delivers all five (5) of the initial DFIA instantiations identified by the Technical Authority Board (TAB) to support common and consistent implementation of security controls across all Navy systems. - Complete development, TAB review, and promulgation of 25 cybersecurity standards to provide a complete set of 39 foundational cybersecurity standards for use and implementation across all Navy systems. - Develop platform as-programmed and target architectures to drive continued progress in reducing the number of unique interfaces across platform configurations through standardization. - Continue IT and IA TA efforts to define, place under configuration control, and manage physical and logical interface requirements and IA controls for systems that connect to the Navy Enterprise Network. - Continue to develop Navy Cybersecurity Situational Awareness (NCSA) requirements and interface specifications and standards to enable integration and interoperability across multiple tools and technologies. - Conduct cyber risk assessment analysis to improve NCSA decision-making regarding the protection, detection, and response to cyber events on Navy networks and systems. - Leverage existing processes (e.g., Systems Engineering Technical Review (SETR), Gate Reviews, etc.) to assess Acquisition Category (ACAT) programs compliance with IT and IA TA specifications and standards. - Mature the common repository as the authoritative source of IT/IA TA architectures, specifications, standards and profiles. Continue efforts to include Integration and Interoperability (I&I) outputs (e.g., Mission Technical					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Baselines (MTBs), Integrated Capability Technical Baselines (ICTBs)) and vignette descriptions within the repository to support mission/capability-driven and System of Systems (SoS) assessments. ***FY 2018 Base Plans:*** - Based on changes in the threat environment and advances in technology, continue to develop the architectures, specifications, and standards that provide the technical foundation of a single, integrated Navy plan for cybersecurity. - Enforce implementation guidance for Navy IA (cybersecurity) standards to ensure inclusion in design requirements and development and production contracts that touch or influence cybersecurity designs for Navy networks. - Review Navy Programs of Record (PoR) plans for implementation of cybersecurity controls, assess compliance with IA TA cybersecurity architectures and standards, and perform risk assessments that articulate systems' ability to effectively support operational missions in various cyber conditions. These assessments will provide operational commanders with a bounded statement of the cyber risk to execute their assigned missions. - Collaborate across Navy Systems Commands (SYSCOMs) to develop domain-specific implementations of the Defense-in-Depth Functional Implementation Architecture (DFIA) by defining control points, Information Assurance (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. These efforts support development of advanced cyber capabilities that enable command and control of Navy networks under all cyber conditions. ***FY 2018 OCO Plans:*** N/A					
Title: Cybersecurity Vulnerability & Functional Test Capability	0.000	0.000	21.313	0.000	21.313
Articles:	-	-	2	-	2
FY 2016 Accomplishments: Cybersecurity compliance testing efforts previously funded under Cybersecurity Architecture, Specifications and Standards (formerly known as Systems Engineering Standards and Processes). ***FY 2017 Plans:***					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604707N / *SEW Architecture/Eng Support*	**Project (Number/Name)** 2144 / *Space & Elec Warfare Engineering*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Cybersecurity compliance testing efforts previously funded under Cybersecurity Architecture, Specifications and Standards (formerly known as Systems Engineering Standards and Processes). ***FY 2018 Base Plans:*** - 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 cybersecurity testing. Procure two (2) laboratory assets, one (1) force-level and one (1) unit-level, to establish C4I suites for testing the system of systems cyber capabilities in an end-to-end environment. - Continue to perform Non-Recurring Engineering (NRE) and testing to evaluate the compliance efforts of Programs of Record (PoR's) with the Department of Defense (DoD) and the Department of Navy (DoN) cybersecurity Test and Evaluation (T&E) policy, directives and requirements. - Design the capability to test operationally representative C4I baselines including force level platforms, unit level platforms, and associated shore services and transport capabilities. - Develop and mature connectivity (including assessment and authorization) strategies to combine SYSCOM laboratories, cyber ranges, and Red Teams to develop more accurate simulations of Navy platforms in operational maritime environments allowing for critical and effective evaluation of cyber threats against specified mission threads. ***FY 2018 OCO Plans:*** N/A					
Title: Enterprise Architecture (Formerly known as Systems Engineering and Integration Revitalization)	0.835	0.969	0.846	0.000	0.846
Articles:	-	-	-	-	-
FY 2016 Accomplishments: - Continued 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 to deliver validated warfighting capabilities. The outputs of these broader analyses identify interoperability issues and cybersecurity vulnerabilities, that would otherwise be unknown, and inform design and development activities across individual programs. - Completed assessments of mission area capabilities for the Anti-Submarine Warfare; Surface Warfare; Intelligence, Surveillance and Reconnaissance (ISR); Targeting Maneuver for Surface Warfare; and Mine Warfare mission areas. Developed course of action options with recommendations to target the cybersecurity and I&I issues identified as highest priority by Fleet operators and the Chief of Naval Operations (CNO) staff.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604707N / *SEW Architecture/Eng Support*	**Project (Number/Name)** 2144 / *Space & Elec Warfare Engineering*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Continued to evolve Assured Command and Control (C2), Battlespace Awareness, and Integrated Fires (IF) Integrated Capability Technical Baselines (ICTBs) to ensure Information Warfare (IW) capabilities align to mission-specific kill chains to reduce interoperability seams across the supporting SoS. - Established robust, foundational mission engineering tools (e.g., executable architecture models) to support I&I technical performance gap analysis and trade recommendations. - Reviewed the impact of I&I Systems Engineering Technical Review (SETR) checklist items on Acquisition Category (ACAT) programs to determine SETR outcomes and acquisition system improvements to deliver fully integrated and interoperable warfighting capabilities.					
FY 2017 Plans: - Continue to refine the I&I Capability framework to support development of mission threads in order to perform SoS analyses of how well systems operate together to deliver validated warfighting capabilities. The outputs of these broader analyses identify interoperability issues and cybersecurity vulnerabilities, that would otherwise be unknown, and inform design and development activities across individual programs. - Continue to evolve Assured C2, Battlespace Awareness, and IF ICTBs to ensure IW capabilities align to mission-specific kill chains to reduce interoperability seams across the supporting SoS. - Establish and mature robust mission engineering tools (e.g., executable architecture models) to support I&I technical performance gap analysis and trade recommendations. - Review impact on Acquisition Category (ACAT) I, II, and III programs of Integration and Interoperability (I&I) Systems Engineering Technical Review (SETR) checklist items on SETR outcomes and acquisition system improvements to deliver fully integrated and interoperable warfighting capability.					
FY 2018 Base Plans: - Develop an overarching Space and Naval Warfare Systems Command (SPAWAR) Enterprise Architecture with associated specifications, standards and profiles that encompasses current and future platform, experimental, software, data, and product architectures to support effective engineering, design, development, acquisition, and delivery of Navy Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR), Business Information Technology (IT), and Space System capabilities. Ensure engagement with Department of Defense (DoD) Joint Information Environment (JIE) and Intelligence Community Information Technology Environment (IC ITE) to promote Joint and Coalition Interoperability. - Develop a single, authoritative SPAWAR architecture repository that provides a technical framework to support engineering and investment decisions across the Information Warfare (IW) portfolio.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Define data engineering models, strategies, and approaches, as well as data-at-rest and data exchange standards, for program and project compliance. This ensures alignment of product architectures across the SPAWAR Enterprise and facilitates data ingestion into the architecture repository. - Continue to refine the 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 to deliver validated warfighting capabilities. The outputs of these broader analyses identify interoperability issues and cybersecurity vulnerabilities, that would otherwise be unknown, and inform design and development activities across individual programs. - Continue to evolve and use Command and Control (C2), Battlespace Awareness, and Integrated Fires (IF) Integrated Capability Technical Baselines (ICTBs) to perform analysis of mission performance and cybersecurity, identify capability gaps, perform engineering trade studies, and inform investment decisions. - Ensure alignment of ICTBs development to emerging Task Force Netted Navy (TFNN) (now know as the Digital Warfare Office (DWO)) objectives for increased interoperability and information sharing across weapons, sensors, and shooters. ***FY 2018 OCO Plans:*** N/A					
Title: SYSCOM Systems Engineering (Formerly known as C4ISR Systems Engineering)	2.562	2.973	2.594	0.000	2.594
Articles:	-	-	-	-	-
FY 2016 Accomplishments: - Continued to provide input and technical reviews of Acquisition documentation to ensure the application of sound systems engineering analysis and design principles to system planning requirements, design, testing, and supportability. - Continued to develop and validate interoperability requirements by performing Systems Engineering Technical Reviews (SETRs) on Acquisition Category (ACAT) programs utilizing validated assessment tools, system engineering methodologies, and SETR checklists tracing system design to standards and requirements, and ensuring interoperability compliance to statutory and regulatory directives. - Continued to provide engineering evaluations and validation of Business Information Technology (IT) applications and IT infrastructure in order to combine, consolidate, and eliminate unnecessary or underutilized business systems. - Continued to provide engineering evaluations, assessments of compliance with authoritative architectures and technical standards, and expertise to address technical issues in the following domains: Command and Control					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
(C2); Intelligence, Surveillance, & Reconnaissance/Information Operations (ISR/IO); Space Systems, Business IT; and Communications & Networks. - Continued to provide 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) was validated to meet the operational need and was interoperable with platform, force level, and joint/allied/coalition forces. ***FY 2017 Plans:*** - Continue to develop and validate interoperability requirements by performing SETRs on ACAT programs utilizing validated assessment tools, system engineering methodologies, and SETR checklists tracing system design to standards and requirements, and ensuring interoperability compliance to statutory and regulatory directives. - Implement continuous improvement on SETR Checklists for ACAT programs by incorporating the latest policy, guidance, standards, and specifications, including specific criteria for effective implementation of and compliance with IT and Information Assurance (IA) Technical Authority (TA) architectures, specifications, standards and profiles. - Continue to develop input and conduct technical reviews of Acquisition documentation to ensure the application of sound systems engineering analysis and design principles to system planning requirements, design, testing, and supportability. - Continue to perform engineering evaluations and validation of Business IT applications and IT infrastructure in order to combine, consolidate, and eliminate unnecessary or underutilized business systems. - 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; ISR/IO; Space Systems, Business IT; and Communications & Networks. - Continue to conduct 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. ***FY 2018 Base Plans:*** - 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) standards.					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- 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. - 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. - 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. - 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: Command and Control (C2); Intelligence, Surveillance, & Reconnaissance/Information Operations (ISR/IO); Space Systems, Business IT; and Communications & Networks. - Execute the Space and Naval Warfare Systems Command (SPAWAR) Engineering Competency Development Model (CDM) to ensure structured workforce development and maturity of the Engineering competency. ***FY 2018 OCO Plans:*** N/A					
Title: Coalition Warrior Interoperability eXploration, eXperimentation, eXamination, eXercise (CWIX) ***Articles:*** ***FY 2016 Accomplishments:*** -Developed interoperability and information sharing through coalition engagement, technology, demonstrations, and assessments leading to improvements of C4ISR systems within the Navy and in conjunction with Joint Services and Coalition efforts. -Enhanced integration and engagement with Pacific Rim (PACOM AO) Coalition partners as well as Coalition partners in the Southern Command Area of Operation (SOUTHCOM AO) by fostering a connected, distributed experimentation environment suitable for expanded experimentation in those areas. -Utilized Coalition Warrior Interoperability eXploration, eXperimentation, eXamination, eXercise (CWIX) infrastructure to enhance interoperability amongst North Atlantic Treaty Organization (NATO) Coalition partners. -Utilized existing events such as Coalition Interoperability Assurance Validation (CIAV) and Coalition Warrior Interoperability eXploration, eXperimentation, eXamination, eXercise (CWIX) to expose interoperability issues	0.837 -	0.983 -	1.032 -	0.000 -	1.032 -

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
between United States (U.S.) and Coalition Partner systems and report issues and possible workarounds to relevant entities. -Leveraged CIAV infrastructure to enhance U.S. maritime interoperability within the Joint Information Environment (JIE) Mission Partner Environment (MPE). -Coordinated experimentation with applicable acquisition and operational entities (i.e. Program Executive Office Command, Control, Communications, Computers, Intelligence (PEO C4I), Component/ Combatant Commanders at the Technical Director and Science Advisor levels) in order to assess interoperability between existing and cutting-edge Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) systems. -Continued development of suitable environments for Joint/Coalition war fighter technology experiments. Periodic connectivity will be continued with end-users in order to provide a distributed Coalition experimentation environment focused enhancement of Navy missions.					
FY 2017 Plans: -Continue to develop interoperability and information sharing through coalition engagement, technology, demonstrations, and assessments leading to improvements of C4ISR systems within the Navy and in conjunction with Joint Services and Coalition efforts. -Pursue greater Pacific Rim (PACOM) Partner Nation and Southern Command (SOUTHCOM) Partner Nation engagement by fostering a connected, distributed experimentation environment suitable for expanded experimentation in those areas. -Foster enhanced interoperability amongst North Atlantic Treaty Organization (NATO) and affiliated Coalition Partners by participating in the planning and execution of CWIX. -Assess Coalition Interoperability assurance, validation, and verification as related to the engineering and execution of the MPE via the CIAV infrastructure. - Coordinate experimentation activities with appropriate acquisition and operational entities (i.e. PEO C4I, Component/ Combatant Commanders at the Technical Director and Science Advisor levels) in order to create synergy and provide the most value.					
FY 2018 Base Plans: -Continue to develop interoperability and information sharing through coalition engagement, technology, demonstrations, and assessments leading to improvements of C4ISR systems within the Navy and in conjunction with Joint Services and Coalition efforts.					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
-Continue to pursue and utilize greater PACOM Partner Nation and 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). -Enhance interoperability amongst North Atlantic Treaty Organization (NATO) and affiliated Coalition Partners by participating in the planning and execution of Coalition Warrior Interoperability eXploration, eXperimentation, eXamination, eXercise (CWIX). -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 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	9.761	13.175	33.716	0.000	33.716

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 Command, Control, Communications, Computers, Intelligence, 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, Intelligence, Networks, Communications, Space, and Business Information Technology (IT) domains.

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

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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joint and coalition information assurance and security standards; and (3) war fighter utility assessment across the joint and coalition spectrum. Specific metrics validate performance of individual technologies participating in CWIX.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604707N / *SEW Architecture/Eng Support*	Project (Number/Name) 2144 / *Space & Elec Warfare Engineering*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Cybersecurity Architecture, Specifications and Standards	Various	Various : Various	5.588	0.000		0.000		0.000		-		0.000	0.000	5.588	-
Cybersecurity Architecture, Specifications and Standards	C/CPFF	ComGlobal : San Diego, CA	1.454	0.000		0.000		0.000		-		0.000	0.000	1.454	-
Cybersecurity Architecture, Specifications and Standards	C/CPFF	AUSGAR : San Diego, CA	3.529	0.974	Mar 2016	1.135	Mar 2017	0.989	Mar 2018	-		0.989	Continuing	Continuing	Continuing
Cybersecurity Architecture, Specifications and Standards	C/CPFF	METRON : Reston, VA	0.813	0.000		0.000		0.000		-		0.000	0.000	0.813	-
Cybersecurity Architecture, Specifications and Standards	C/CPFF	SAIC : McLean, VA	0.812	0.000		0.000		0.000		-		0.000	0.000	0.812	-
Cybersecurity Architecture, Specifications and Standards	WR	SSC LANT : Charleston, NC	1.991	0.885	Feb 2016	1.238	Feb 2017	1.189	Feb 2018	-		1.189	Continuing	Continuing	Continuing
Cybersecurity Architecture, Specifications and Standards	WR	SSC PAC : San Diego, CA	5.222	2.191	Feb 2016	3.013	Feb 2017	2.886	Feb 2018	-		2.886	Continuing	Continuing	Continuing
Cybersecurity Architecture, Specifications and Standards	C/CPFF	BAH : McLean, VA	3.200	1.494	Aug 2016	2.864	Aug 2017	2.867	Aug 2018	-		2.867	Continuing	Continuing	Continuing
Cybersecurity Vulnerability & Functional Test Capability	C/CPFF	SSC : San Diego, CA	0.000	0.000		0.000		2.880	Jun 2018	-		2.880	0.000	2.880	-
Cybersecurity Vulnerability & Functional Test Capability	WR	SSC PAC : San Diego, CA	0.000	0.000		0.000		13.262	Dec 2017	-		13.262	0.000	13.262	-
Cybersecurity Vulnerability & Functional Test Capability	WR	SSC LANT : Charleston, NC	0.000	0.000		0.000		4.421	Dec 2017	-		4.421	0.000	4.421	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604707N / *SEW Architecture/Eng Support*	**Project (Number/Name)** 2144 / *Space & Elec Warfare Engineering*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Cybersecurity Vulnerability & Functional Test Capability	C/CPFF	TBD : TBD	0.000	0.000		0.000		0.750	Oct 2017	-		0.750	0.000	0.750	-
		Subtotal	22.609	5.544		8.250		29.244		-		29.244	-	-	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Support	Various	Various : Various	4.554	0.000		0.000		0.000		-		0.000	0.000	4.554	-
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	2.383	0.000		0.000		0.000		-		0.000	0.000	2.383	-
Enterprise Architecture	C/CPFF	ComGlobal : San Diego, CA	0.565	0.000		0.000		0.000		-		0.000	0.000	0.565	-
Enterprise Architecture	C/CPFF	AUSGAR : San Diego, CA	1.367	0.373	Mar 2016	0.436	Mar 2017	0.380	Mar 2018	-		0.380	Continuing	Continuing	Continuing
Enterprise Architecture	C/CPFF	METRON : Reston, VA	0.316	0.000		0.000		0.000		-		0.000	0.000	0.316	-
Enterprise Architecture	C/CPFF	SAIC : McLean, VA	0.316	0.000		0.000		0.000		-		0.000	0.000	0.316	-
Enterprise Architecture	WR	SSC LANT : Charleston, NC	0.869	0.125	Feb 2016	0.145	Feb 2017	0.127	Feb 2018	-		0.127	Continuing	Continuing	Continuing
Enterprise Architecture	WR	SSC PAC : San Diego, CA	2.094	0.333	Feb 2016	0.388	Feb 2017	0.339	Feb 2018	-		0.339	Continuing	Continuing	Continuing
Enterprise Architecture	WR	NRL : Washington, D.C.	0.050	0.000		0.000		0.000		-		0.000	0.000	0.050	-
Systems A&E and Validation	Various	Various : Various	13.188	0.000		0.000		0.000		-		0.000	0.000	13.188	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604707N / *SEW Architecture/Eng Support*	**Project (Number/Name)** 2144 / *Space & Elec Warfare Engineering*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Distributed C2 Interoperability Requirement analysis	Various	Various : Various	16.583	0.000		0.000		0.000		-		0.000	0.000	16.583	-
C4ISR Architecture and Standards	Various	Various : Various	14.268	0.000		0.000		0.000		-		0.000	0.000	14.268	-
End-to-End System Engineering and Integrated Design	Various	Various : Various	10.994	0.000		0.000		0.000		-		0.000	0.000	10.994	-
Info. Repository/Naval Architecture	Various	Various : Various	4.000	0.000		0.000		0.000		-		0.000	0.000	4.000	-
SYSCOM Systems Engineering	Various	Various : Various	5.157	0.000		0.000		0.000		-		0.000	0.000	5.157	-
SYSCOM Systems Engineering	WR	NSWC Dahlgren : Dahlgren, MD	0.879	0.000		0.000		0.000		-		0.000	0.000	0.879	-
SYSCOM Systems Engineering	MIPR	DISA : Pensacola, FL	0.266	0.000		0.000		0.000		-		0.000	0.000	0.266	-
SYSCOM Systems Engineering	C/CPFF	ComGlobal : San Diego, CA	7.636	0.000		0.000		0.000		-		0.000	0.000	7.636	-
SYSCOM Systems Engineering	C/CPFF	AUSGAR : San Diego, CA	1.610	1.505	Mar 2016	1.755	Mar 2017	1.529	Mar 2018	-		1.529	Continuing	Continuing	Continuing
SYSCOM Systems Engineering	WR	SSC LANT : Charleston, NC	0.440	0.000		0.000		0.000		-		0.000	0.000	0.440	-
SYSCOM Systems Engineering	WR	SSC PAC : San Diego, CA	4.747	0.740	Feb 2016	0.863	Feb 2017	0.754	Feb 2018	-		0.754	Continuing	Continuing	Continuing
SYSCOM Systems Engineering	C/CPFF	SAIC : McLean, VA	0.326	0.304	Jan 2016	0.355	Jan 2017	0.311	Jan 2018	-		0.311	Continuing	Continuing	Continuing
SYSCOM Systems Engineering	WR	NAVAIR : Patuxent River, MD	0.088	0.000		0.000		0.000		-		0.000	0.000	0.088	-
SYSCOM Systems Engineering	MIPR	CECOM : Fort Monmouth, NJ	0.264	0.000		0.000		0.000		-		0.000	0.000	0.264	-
SYSCOM Systems Engineering	MIPR	AF : Hill AFB, UT	0.220	0.000		0.000		0.000		-		0.000	0.000	0.220	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604707N / *SEW Architecture/Eng Support*	**Project (Number/Name)** 2144 / *Space & Elec Warfare Engineering*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	123.541	3.380		3.942		3.440		-		3.440	-	-	-

Remarks

Cost Category titles changed as follows:
-Cybersecurity Architecture, Specifications and Standards (formerly known as Systems Engineering Standards and Processes)
-Enterprise Architecture (formerly known as Systems Engineering and Integration Revitalization)
-Systems Command (SYSCOM) Systems Engineering (formerly known as Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) Systems Engineering)

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SEW Eng/CWIX	Various	Various : Various	30.171	0.000		0.000		0.000		-		0.000	0.000	30.171	-
SEW Eng/CWIX	MIPR	Defense Information Systems Agency : Arlington, VA	0.506	0.093	Apr 2016	0.110	Apr 2017	0.115	Apr 2018	-		0.115	Continuing	Continuing	Continuing
SEW Eng/CWIX	WR	Joint Interoperability Test Command : Fort Huachuca, AZ	2.204	0.000		0.000		0.000		-		0.000	0.000	2.204	-
SEW Eng/CWIX	WR	SSC PAC : San Diego, CA	3.510	0.467	Dec 2015	0.549	Dec 2016	0.576	Dec 2017	-		0.576	Continuing	Continuing	Continuing
SEW Eng/CWIX	MIPR	US Northern Command : Peterson AFB, CO	0.332	0.000		0.000		0.000		-		0.000	0.000	0.332	-
SEW Eng/JRAE	Various	Various : Various	15.978	0.000		0.000		0.000		-		0.000	0.000	15.978	-
SEW Eng/CWIX	C/CPFF	SAIC : McLean, VA	0.317	0.181	Aug 2016	0.213	Aug 2017	0.223	Jun 2018	-		0.223	Continuing	Continuing	Continuing
SEW Eng/CWIX	C/CPFF	AUSGAR : San Diego, CA	0.167	0.096	Mar 2016	0.111	Mar 2017	0.118	Mar 2018	-		0.118	Continuing	Continuing	Continuing
		Subtotal	53.185	0.837		0.983		1.032		-		1.032	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604707N / *SEW Architecture/Eng Support*	**Project (Number/Name)** 2144 / *Space & Elec Warfare Engineering*

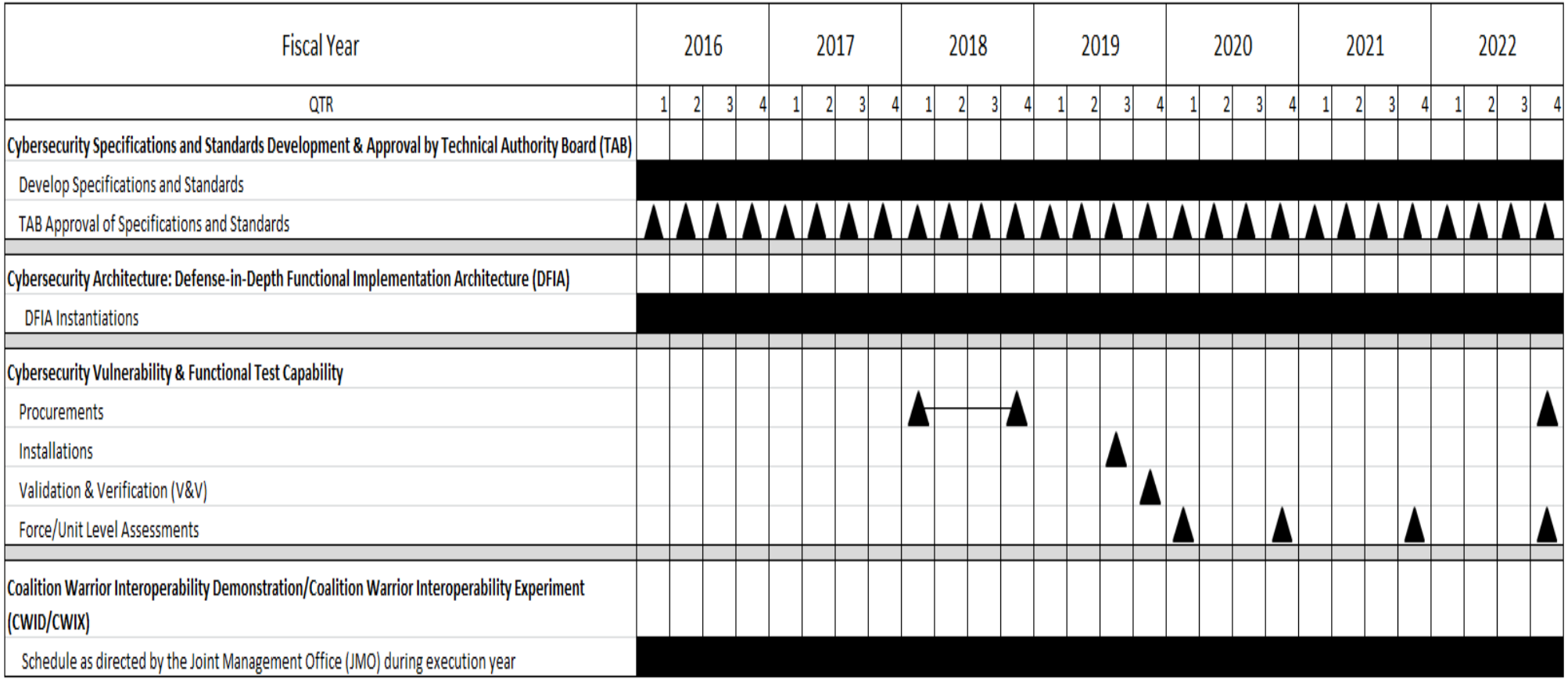
Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 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	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	199.406	9.761		13.175		33.716		-		33.716	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604707N / *SEW Architecture/Eng Support*	**Project (Number/Name)** 2144 / *Space & Elec Warfare Engineering*



Notes:

-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: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604707N / *SEW Architecture/Eng Support*	**Project (Number/Name)** 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	2016	4	2022
Cybersecurity Specifications and Standards: Technical Authority Board (TAB) Approval	1	2016	4	2022
Cybersecurity Architecture: Defense-in-Depth Functional Implementation Architecture (DFIA) Instantiations	1	2016	4	2022
Cybersecurity Vulnerability & Functional Test Capability: FY18 Procurement	1	2018	4	2018
Cybersecurity Vulnerability & Functional Test Capability: FY22 Procurement	4	2022	4	2022
Cybersecurity Vulnerability & Functional Test Capability: Installations	3	2019	3	2019
Cybersecurity Vulnerability & Functional Test Capability: Validation & Verification	4	2019	4	2019
Cybersecurity Vulnerability & Functional Test Capability: Initial Assessments	1	2020	1	2020
Cybersecurity Vulnerability & Functional Test Capability: FY20 Assessments	4	2020	4	2020
Cybersecurity Vulnerability & Functional Test Capability: FY21 Assessments	4	2021	4	2021
Cybersecurity Vulnerability & Functional Test Capability: FY22 Assessments	4	2022	4	2022
Coalition Warrior Interoperability Demonstration/Coalition Warrior Interoperability Experiment (CWID/CWIX): Schedule as directed by the JMO during execution year	1	2016	4	2022

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604707N / *SEW Architecture/Eng Support*	Project (Number/Name) 2147 / *ISR Architecture*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2147: *ISR Architecture*	0.000	0.000	1.523	1.587	-	1.587	1.583	1.584	1.585	1.617	Continuing	Continuing
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 systems of systems 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 (JIE) and Intelligence Community (IC) Information Technology Environment (ITE) and Space & Naval Warfare Systems Command (SPAWAR)-wide Enterprise Architecture policies. As tasked by the Navy's ISR Council, 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 (IT)/ISR infrastructure complexity and variance, making it easier to manage, operate and defend our ISR capabilities, and help inform investment decisions across the Navy's ISR enterprise to support the Office of the Chief of Naval Operations (OPNAV) objectives for Assured Command and Control (C2), Battlespace Awareness and Integrated Fires (IF).

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 (DOTMLPF) spectrum.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Intelligence, Surveillance, and Reconnaissance (ISR) Architecture	0.000	1.523	1.587	0.000	1.587
Articles:	-	-	-	-	-
FY 2016 Accomplishments: N/A					
FY 2017 Plans: -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.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604707N / *SEW Architecture/Eng Support*	**Project (Number/Name)** 2147 / *ISR Architecture*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
-Build on the documentation and analysis of the enterprise ISR capabilities to support system of systems engineering assessments to identify integration and interoperability gaps, trades, and solutions for sponsor-related equities. -Integrate the National Intelligence, Surveillance, and Reconnaissance (ISR) and Naval (Navy and Marine Corps) ISR architectures within mission contexts to identify functional capacities, materiel integration and interoperability gaps and overlaps, as well as any policy and doctrine impacts. -Perform Verification and Validation (V&V) to ensure ISR architecture and analytic products accurately capture system performance specifications. -Capture all architectural data in the Space & Naval Warfare Systems Command (SPAWAR) analysis tool suite to support rigorous engineering assessments and architecture excursions against solution alternatives.					
FY 2018 Base Plans: -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. -Build on the documentation and analysis of the enterprise ISR capabilities to support system of systems engineering assessments to identify integration and interoperability gaps, trades, and solutions to support investment decision-making across the ISR portfolio. -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. -Ensure alignment and interoperability between ISR Architectures and Joint Information Enterprise (JIE), Intelligence Community (IC) Information Technology Enterprise (ITE) and SPAWAR Enterprise Architectures. -Perform V&V to ensure ISR architecture and analytic products accurately capture system performance specifications. V&V activities are essential to ensuring data, pulled from a broad range of sources with varying pedigree, can be reliably used to support modeling and simulation efforts and results in effective analyses and recommendations. -Capture all architectural data in the SPAWAR analysis tool suite to support rigorous engineering assessments and architecture excursions against solution alternatives.					
FY 2018 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604707N / *SEW Architecture/Eng Support*	**Project (Number/Name)** 2147 / *ISR Architecture*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A					
Accomplishments/Planned Programs Subtotals	0.000	1.523	1.587	0.000	1.587

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

The Naval Intelligence, Surveillance, and Reconnaissance (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 provide solution recommendations. These combined efforts support the ability to articulate risks and align and 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, model-validated solution recommendations against quantified technical and operational performance parameters.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319 / 4					R-1 Program Element (Number/Name) PE 0604707N / *SEW Architecture/Eng Support*				Project (Number/Name) 2356 / *Maritime Concept Generation & Development*			
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
2356: *Maritime Concept Generation & Development*	19.141	3.268	8.320	6.452	-	6.452	7.451	8.450	9.333	9.520	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Maritime Concept Generation and Development 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 (wargames, 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 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 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 to NWDC who plans, executes, and assesses fleet experimentation for the fleets and warfighting development centers (WDC) at the operational and tactical levels. This experimentation includes a focus on NWDC's 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. Fleet experimentation seeks to solve fleet-identified warfighting gaps (referenced within the Integrated Prioritized Capability Lists (IPCL), Urgent Operational Needs Statements (UONS), CUSFF/CPF Commander's Guidance, etc.). The experimentation and prototyping efforts of the NWDC team support the "last tactical mile" of many Navy Science and Technology (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 Fleet and NWDC 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

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604707N / *SEW Architecture/Eng Support*	**Project (Number/Name)** 2356 / *Maritime Concept Generation & Development*

(JSAF) 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.

Typical 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Maritime Concept Generation and Development	3.268	8.320	6.452	0.000	6.452
Articles:	-	-	-	-	-
Description: In FY 2016, this project funded/provided: - NWDC management, planning, and execution and analysis support to Fleet experimentation. - Modeling and Simulation support for Fleet experimentation. - Tactics, Techniques, Procedures (TTP) development.					
FY 2016 Accomplishments: NWDC, responsible for the planning, execution, and assessment of fleet experimentation, used Project 2356 funding for naval warfare subject matter expertise, experiment execution expertise, and analysis expertise to conduct experimentation on emerging warfighting capabilities as identified by CUSFF/CPF. This same team also served to integrate tactical/operational level experimentation campaign efforts with the Navy's Warfighting Development Centers (WDCs) in support of advanced cross domain warfighting and maritime command and control (C2) lines of operation. For Fleet Experimentation FY16 Fleet Experimentation was based on four USFF/CPF directed focus areas to include, in very broad terms, Electromagnetic Maneuver Warfare, Naval Integrated Fires, Mine Warfare, and Unmanned Systems.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604707N / *SEW Architecture/Eng Support*	**Project (Number/Name)** 2356 / *Maritime Concept Generation & Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Additionally, experimentation was conducted in connection with the introduction of new platform capabilities. NWDC planned, executed and assessed the following 2016 experimentation efforts: KRYSTAL SPHINX At-Sea Experiment * This at-sea effort to examine the warfighting utility of a classified prototype addressing a Fleet urgent operational need was completed in the Virginia Capes operating area 08-11 March 2016. The experiment collected data from 58 aircraft test runs conducted over two days. * Fourteen personnel from the following commands participated in the experiment: U.S. Fleet Forces Command, Navy Warfare Development Command, U.S. Naval Research Laboratory, U.S. Sixth Fleet, Naval Expeditionary Task Force, Europe and Africa (CTF 68), Navy Information Operations Command Norfolk. * A classified quicklook of the experiment is available on the SIPRNet Fleet Experimentation Information Management System (FIMS) web portal. The Final Experiment Report will be delivered in August 2016. EMW Technical War Game (Spectral Tsunami 16) * The Spectral Tsunami 16 war game, completed 07-10 March 2016 in Quantico, VA, provided a venue to obtain and characterize the cognitive aspects of mission planning from Fleet operators, with specific emphasis on the C2 and synchronization of Integrated Fires. * Following completion, the game output was injected into NWDC's Naval Simulation System (NSS) for advanced modeling and simulation (M&S) to quantify the tactical and operational impacts of various proposed science and technology solutions and innovative employment methods. * A classified quicklook and Final Experiment Report with multiple DOTMLPF change recommendations are available on the SIPRNet Fleet Experimentation Information Management System (FIMS) web portal. Logistics Force Assured C2 War Game * The war game, completed 21-24 March 2016 in the NWDC Navy Center for Advanced Modeling and Simulation (NCAMS), focused on the examination of logistics functions, processes, and capabilities and their possible vulnerabilities to cyber exploitation. * The results of this event, through the data collected, the final experiment report, and a draft operational logistics concept provide the Fleet with a better understanding of current logistics informational flow to include frequency, means and mode; an improved understanding of the vulnerability of logistic information on multiple nets; and an understanding of a proposed prioritization of logistic information. Additionally, alternatives to reduce logistic information vulnerabilities and understanding the impact to logistics functions as a result of reduced communications capability for each use case were provided. * A classified quicklook and Final Experiment Report with multiple DOTMLPF change recommendations are available on the SIPRNet Fleet Experimentation Information Management System (FIMS) web portal.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604707N / *SEW Architecture/Eng Support*	**Project (Number/Name)** 2356 / *Maritime Concept Generation & Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Fleet Battle Experiment EMW 2016 (FBX EMW 16) * The Fleet Battle Experiment EMW 2016 series of experiments leveraged at-sea venues to inform rapid development of EMW-related tactics, techniques, and procedures (TTPs) through the integration of fielded and emerging systems. * The first in the series, FBX 16-1, was completed during Carrier Strike Group Ten (CSG 10) Composite Training Unit Exercise (C2X) from 14-18 March 2016. Units supporting experimentation included USS DWIGHT D EISENHOWER (CVN 69), USS SAN JACINTO (CG 56), and USS STOUT (DDG 55). FBX 16-1 focused on two (of four) EMW objectives: Battlespace Awareness (BA) and Assured Command and Control (AC2). * A classified FBX 16-1 Quicklook is available on the SIPRNet Fleet Experimentation Information Management System (FIMS) web portal. * FBX 16-2 was completed during USS DWIGHT D EISENHOWER'S deployment from 08-12 June 2016. Other participants included: USS SAN JACINTO (CG 56), USS MONTEREY (CG 61), and USNS BIG HORN (T-AO-198). FBX 16-2 focused on one (of four) EMW objectives: Assured Command and Control (AC2). Specific initiatives included: Optimizing Receive-Only Broadcasts and Managing Bandwidth Afloat. * FBX 16-3 was completed during joint exercise VALIANT SHIELD 2016 from 10-23 Sep 2016. Experimentation focused on EMW Assured Command and Control and Distributed Lethality. Specific initiatives included: Optimizing Receive-Only Broadcasts, Managing Bandwidth Afloat, Clutch Shot, and Joint Net-Enabled Weapons. Participants included: USS RONALD REAGAN (CVN 76), USS BONHOMME RICHARD (LHD 6), USS CHANCELLORSVILLE (CG 62), and USS GERMANTOWN (LSD 42). * The classified results of these three events will be documented in the FBX EMW 16 Final Experiment Report (with multiple DOTMLPF change recommendations) to be delivered by the end of 2016. Counter-Unmanned Aerial System (UAS) Ashore Demonstration * This two phase experiment was designed to examine the performance of two counter-UAS systems to inform the development of naval facilities Anti-Terrorism Force Protection (ATFP) Standard Operating Procedures. * Phase 1, a Drone Defender technology demonstration, was completed 06-07 Apr 16 at the ranges in Yuma, AZ. * Phase 2, a Persistent Ground Surveillance Tower (PGST) technology demonstration, was completed 11-15 Apr 16. * A classified Counter-UAS Demonstration Final Report is available on the SIPRNet Fleet Experimentation Information Management System (FIMS) web portal. MDUSV Mission Analysis Workshop * The first prototype Medium Displacement Unmanned Surface Vessel (MDUSV), developed by DARPA, was delivered to the Navy in May 2016. The Office of Naval Research (ONR) signed a Memorandum of Agreement					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604707N / *SEW Architecture/Eng Support*	**Project (Number/Name)** 2356 / *Maritime Concept Generation & Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
(MOA) with DARPA to jointly fund an extended test phase of the MDUSV aimed at informing Navy acquisition decisions. MDUSV will be a multi-mission platform with modular payload capability initially trialing three specific payloads (ASW, MIW, and EW). * The workshop, completed at Commander, Third Fleet Headquarters from 01-02 June 2016, provided fleet subject matter experts an opportunity to examine potential missions a MDUSV could undertake. * 45 workshop participants from a variety of warfighting disciplines, split into two working groups, identified 302 suggested tasks for a MDUSV. The 302 tasks were assigned to 59 mission-like groups. * A classified Analysis Summary Reference Document will be delivered in August 2016. Mine Countermeasures (MCM) War Game * The MCM war game, completed 06-10 Jun 16 in the NWDC Naval Center for Advanced Modeling and Simulation (NCAMS), was the first of two FY16 war games that support an FY17 At-Sea Mine Warfare experiment. The goal of the game was to explore MCM operations using MCM adaptive force packages (AFPs) embarked aboard multiple alternative naval platforms (i.e. LCS, T-EPF, T-ESB) as well as current and near term MCM technologies and concepts to enhance MCM. * A classified quicklook is available on the SIPRNet Fleet Experimentation Information Management System (FIMS) web portal. The Final Experiment Report will be delivered in August 2016. TRIDENT WARRIOR 2016 * This large-scale, at-sea experiment was completed in conjunction with exercise RIMPAC 2016 from 16 Jun-08 Aug 16 in the Southern California and Hawaiian operating areas. * 36 individual experiment initiatives were executed to explore innovative solutions to fleet-identified gaps and evaluate the ability of new, emerging, and updated doctrine and technologies to improve military operations and address warfighter capability gaps by putting them at sea and in the hands of warfighters. * A quicklook report was delivered in August 2016, followed by a Final Experiment Report in September 2016. Health Services Support (HSS) War Game * Commander, U.S. Pacific Fleet (COMPACFLT), in collaboration with NWDC, hosted an HSS focused logistics war game on 29 Aug - 01 Sep 16 at Pearl Harbor, HI. The purpose of the game was to explore and examine HSS concept of support and capabilities in order to assess how the COMPACFLT maritime HSS plan supports warfighting plan execution. * A quicklook report was delivered in September 2016, followed by a Final Experiment Report in November 2016. USV Swarm II Demonstration					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604707N / *SEW Architecture/Eng Support*	**Project (Number/Name)** 2356 / *Maritime Concept Generation & Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
* SWARM II is the second event of a five event campaign executed by ONR (supported by NWDC) as part of the USV Autonomy Future Naval Capability (FNC) program. SWARM II consisted of an at-sea technical demonstration completed in Oct 16. A report of observation will be delivered in Nov 16. Unmanned Warrior * Unmanned Warrior 2016 was a United Kingdom (UK) hosted multi-national naval and industry technical demonstration and exercise event held at-sea in Oct 2016 in the vicinity of the UK. * NWDC leveraged the event to evaluate the Collaborative UUV Operations Tactical Memorandum (TACMEMO) - a product of the FY15 Collaborative UUV War Game. Radiant Delphi At-Sea * This classified experiment, completed at-sea in October 2016, examined the capabilities of a Navy Tactical Exploitation of National Capabilities (TENCAP) project in an operational, at-sea environment to determine the contribution it makes to Joint Integrated Air and Missile Defense. Netted Sensor War Game * As a continuation of a series of Netted Sensor FLEX efforts, NWDC completed a war game in October 2016 to examine the integrated employment of national, theater, and tactical C5ISR systems in support of effective maneuver and engagement in a long-range war at sea scenario. The outcome of the war game (supported by the conduct of three workshops) will inform the baseline for an at-sea netted sensor experiment in FY17. Mining War Game * In support of Mine Warfare, NWDC and CPF will conduct a mining war game from 15-17 Nov 2016 to explore options available to improve naval/joint mining capabilities. For Concept Generation/Concept Development * The Electromagnetic Maneuver Warfare (EMW) concept was endorsed by CUSFFC and CPF, and approved by the CNO in early FY 16. The EMW campaign plan guides implementation of the concept throughout the Fleet. * Analysis and information to update the Rail Gun Operating Concept (RGOC) was provided to Naval Sea Systems Command (NAVSEA 405) in early FY 16. * Operational Logistics Concept (OpLog). NWDC drafted a white paper and draft concept that describes a concept for conducting logistics in contested environments. The OpLog concept is currently at 4 star flag review. It's anticipated that after 4 star endorsement, it will be delivered to the CNO for approval early FY 17. * Littoral Operations in a Contested Environment (LOCE). Based on guidance provided by the CNO and CMC and an OPNAV/HQMC PLANORD, NWDC and Marine Corps Warfighting Lab (MCWL) jointly developed a draft LOCE concept for integrated naval operations in contested littorals. The joint writing team utilized a CNA					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
sponsored wargame in Dec '15 as well as the Naval Service Game in Feb '16 to support concept development. This concept will provide innovative command and control and capability solutions for integrated sea control and power projection operations in contested littorals. The concept is currently under Navy and Marine Corps 3-4 star flag review before signature from CNO and CMC in FY 17.					
FY 2017 Plans: New FY 2017 experiment efforts through 2356; NWDC will continue to provide naval warfare subject matter expertise, experiment execution expertise, and analysis expertise to conduct experimentation on emerging warfighting capabilities as identified by CUSFF/CPF; 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 efforts: Electromagnetic Maneuver Warfare (EMW) Experimentation Campaign In accordance with the EMW Charter, the CNO has assigned responsibility to Commander, U.S. Fleet Forces Command to create and execute the Navy-wide campaign to achieve Navy's articulated EMW end state by 2020. Additionally, the charter assigns NWDC as the EMW Action Lead and the lead for the Concepts, Doctrine, and Experimentation Level of Effort (LOE). Throughout FY17, NWDC will conduct a series of 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. Specific events planned for FY17 include: Fleet Battle Experiment 2017 (FBX 17) At-Sea - FBX 17 will be a combination of workshops and at-sea events leveraging existing and standalone Fleet venues that will build towards an FY18 comprehensive at-sea experiment. At-Sea Experiment - This classified effort, planned for execution in late 2017, is a follow-on at-sea event to the table-top war game completed in 2016. Spectral Tsunami 2017 Seminar War Game - This effort is guided by an O-6 EMW working group, chaired by OPNAV N2N6F3, 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 game will be used to 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.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Independent Deployer Experiments - This effort will leverage FY17 deployments to conduct extended evaluations of emerging concepts, tactics, and/or technologies in the hands of fleet operators in an operational environment. Emerging Concepts Wargame(s) - This effort will employ one or more seminar wargames to examine emerging concepts such as Distributed Maritime Operations, Littoral Operations in a Contested Environment or Operational Logistics. Naval Integrated Fires (NIF) Experimentation Campaign The NIF Campaign is part of the USFF-directed multi-year campaign plan that began in 2013 to explore NIFC-CA capabilities, C2 decision-making, training, and CONOPS/TTP development and refinement. A comprehensive campaign methodology is required to synchronize delivery of all NIF DOTMLPF actions and to provide Navy leadership with insight into challenges and limitations associated with NIF. Specific events planned for FY17 include: Netted Sensors At-Sea Experiment - This at-sea experiment is the continuation of a series of efforts to examine the employment of multiple programs of record, prototypes, and current/developmental tactics, techniques, and procedures (TTPs) to fulfill the vision that "every platform is a sensor and every sensor is netted." TRIDENT WARRIOR 2017 (TW17) At-Sea Experiment - The TW17 experiment will execute in partnership with Commander, Third Fleet. The effort will evaluate technology and/or TTP-related initiatives to close warfighting gaps identified across multiple POM-18 Integrated Prioritized Capability Lists (IPCLs). TW17 will support OPNAV, SPAWAR, program offices, ONR, NRL, and others in the spiral development of prototype capabilities at sea and in the hands of warfighters. Bold Alligator 2017 At-Sea Experimentation - This effort will leverage the fleet assets and at-sea time associated with a major Atlantic fleet training exercise, Bold Alligator 2017, to explore innovative technologies and TTPs focused on improving naval amphibious warfighting capabilities at the operational and tactical levels of war. Red Nitrum At-Sea Experiment - This at-sea experiment is the continuation of a series of efforts to examine the impact of advanced electronic attack on Navy surface and air sensors and weapon systems. Full Spectrum Mine Warfare (MIW) Experimentation Campaign * The MIW Campaign is part of the USFF-directed multi-year campaign plan to examine U.S. and coalition emerging technologies and TTP to improve full detect-to-engage MCM capabilities and reinvigorate Navy and Joint mining capability. Specific events planned for FY17 include: MIW At-Sea Experiment - This at-sea experiment will examine selected innovative technologies and TTPs enabling capabilities in an operational environment to support the transition of MIW capabilities from legacy manned platforms to future unmanned systems. Unmanned Systems (UxS) Experimentation Campaign					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
The UxS Campaign is part of the USFF-directed multi-year campaign plan focused on leveraging and integrating unmanned systems and TTP development/improvement to support offensive and defensive actions. Specific events planned for FY17 include: Counter Unmanned Systems (UxS) Experiment - This event will focus specifically on Navy capabilities and limitations to detect, track, and counter adversary unmanned systems. Unmanned Systems Experiment - This event will examine the capabilities of various unmanned systems and associated tactics, techniques, and procedures to contribute to multiple naval missions and close identified warfighting gaps. Specific areas of interest include, but are not limited to: persistent ISR, intelligence preparation of the environment, C2 of UxS, employment of armed UxS, UxS in support of SUW, ASW, and MIW. Office of Naval Research (ONR) Technology Innovation Games (TIGs) - This series of smaller, iterative analytical workshops will be conducted in partnership with ONR to better inform naval strategy development, campaign analysis, and at-sea fleet experimentation. Specific workshops include: Low Cost UAV Swarming Technology (LOCUST) concepts of employment, Medium Displacement USV (MDUSV) ASW payload employment, and Unmanned System (UxS) force protection. For FY 17 Concept Generation/Concept Development * Continue CG/CD development efforts that carry-over from FY 2016: * Operational Logistics Concept (OpLog). NWDC drafted a white paper and draft concept that describes a concept for conducting logistics in contested environments. The OpLog concept is currently at 4 star flag review. It's anticipated that after 4 star endorsement, it will be delivered to the CNO for approval early FY 17. * Littoral Operations in a Contested Environment (LOCE). Based on guidance provided by the CNO and CMC and an OPNAV/HQMC PLANORD, NWDC and Marine Corps Warfighting Lab (MCWL) jointly developed a draft LOCE concept for integrated naval operations in contested littorals. The joint writing team utilized a CNA sponsored wargame in Dec '15 as well as the Naval Service Game in Feb '16 to support concept development. This concept will provide innovative command and control and capability solutions for integrated sea control and power projection operations in contested littorals. The concept is currently under Navy and Marine Corps 3-4 star flag review before signature from CNO and CMC in FY 17. * Distributed Maritime Operations (DMO). NWDC will lead the development of the DMO concept and doctrine in support of USFFC overall Fleet Design concept. ***FY 2018 Base Plans:*** New FY 2018 experiment efforts through 2356; Navy Warfare Development Command (NWDC) 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					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
innovative solutions for fleet experiments that address prioritized fleet warfighting gaps; and identify suitable events to support the execution of the following Experimentation Campaigns: Fleet Design Campaign * Continuing the development of the supporting doctrine, 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 18 experiments (both at-sea and via war games) will strive to achieve the objectives as laid out in the accompanying action/implementation plan. EMW Experiment Campaign / Naval Integrated Fires Campaign * NWDC 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. Specific events currently planned for FY18 include: * Fleet Battle Experiment EMW (FBX 18). FBX 18 will consist of a large, free play-based event focused on an assessment across the EMW objective areas. The primary focus of this effort will be to revise and validate the contents of existing and newly developed EMW-related doctrine, TTP, and CONOPS. * EMW Technical War Game (Spectral Tsunami 18-1). Spectral Tsunami 18-1 is the last in a series of war games planned to evaluate the individual and cumulative effects of emerging capabilities in vignette-based scenarios and to enable operators to work side-by-side with technology developers to identify ways to close capability gaps in an effort to reach the articulated EMW 2020 endstate. Unmanned Systems Experimentation * This effort will be conducted to examine (via both at-sea events and war game / workshop venues) not only the warfighting utility and multiple employment options offered by various types of unmanned systems in support of naval warfare missions but also the key enablers required to maintain and control these evolving systems for enduring missions. * Additionally, both at-sea and war game / workshop venues will be used to refine our abilities to counter UxS as it applies across the breadth of naval missions. * Emerging Concepts Wargame(s) - This effort will employ multiple seminar wargames to examine emerging concepts such as Distributed Maritime Operations, Littoral Operations in a Contested Environment or Operational Logistics. * Trident Warrior 2018 At-Sea Experiment. The TRIDENT WARRIOR 2018 (TW18) experiment will execute in partnership with a numbered fleet commander. The effort will evaluate technology and/or TTP-related initiatives					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
to close warfighting gaps identified across multiple Integrated Prioritized Capability Lists (IPCLs). TW18 will support programs in the spiral development of prototype capabilities at sea and in the hands of warfighters. Mine Warfare * FY 18 efforts will continue to examine TTP and C2 construct for our future MCM force as programs of record and unmanned systems come on line through workshops/ war games and at-sea events. For FY 18 Concept generation/Concept Development * Continue CG/CD development efforts that carry-over from FY 2017: * In support of USFFC, NWDC tasked to development enabling concepts for Fleet Design. This includes development of Distributed Maritime Operations concept (DMO). ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	3.268	8.320	6.452	0.000	6.452

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

The vast majority of 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 in the fleet.
- 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.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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- 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-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604707N / *SEW Architecture/Eng Support*	Project (Number/Name) 3319 / *Fleet Experimentation*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3319: *Fleet Experimentation*	50.794	8.543	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	59.337
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

In FY17, project 3319 moved to PE 0606355N.

A. Mission Description and Budget Item Justification

The Fleet Experimentation (FLEX) program examines the doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy (DOTMLPF-P) solutions to identified warfighter capability gaps within the FYDP. The FLEX program considers warfighting gaps identified in: Integrated Prioritized Capability Lists (IPCL) generated by Warfighting Development Centers (WDC) through the warfare improvement program; USFF/CPF's Integrated Priorities Letter (IPL) delivered annually to the CNO; USFF/CPF's Commanders' FLEX Guidance; and Navy and Joint Urgent Operational Needs Statements. In addition, FLEX addresses innovative concepts, and tactics, techniques, and procedures (TTP), and Fleet Concepts of Operation (CONOPS) that collectively mitigate Fleet-identified warfighting capability gaps as defined by Commander, U.S. Fleet Forces' (CUSFF)/Commander, Pacific Fleet's (CPF) annual FLEX guidance. Through experimentation activities such as workshops, system or seminar war games, live at-sea events, and experimentation campaigns, the FLEX program examines potential materiel and non-materiel tangible solutions that will enhance the Fleet's ability to execute assigned missions. FLEX events and campaigns are comprised of all facets of experimentation including design, planning, systems engineering and integration, execution, data collection, analysis, assessment, and the delivery of tangible products to the fleet. While Navy-centric, FLEX efforts include joint, coalition, Science and Technology (S&T), academia, and industry partners.

Experimentation is vital to continuously improving naval warfighting capabilities. As such, the FLEX program directly supports four of the five elements outlined in the Secretary of the Navy's Innovation Vision: Build the Naval Innovation Network, Improve the Use of DON Information, Accelerate Emerging Operational Capabilities to the Fleet, and Develop Game-Changing Warfighting Concepts. In accordance with the joint CUSFF and CPF FLEX instruction, the FLEX program is the conduit to conduct experimentation using operational fleet assets. As such, the FLEX program, and associated efforts of the FLEX team, provides critical support to achieve the "last tactical mile" of Navy and S&T programs. This "last tactical mile" support is delivered through "at sea" or "salt-water" testing and experimentation at the point when the technology is sufficiently mature and requires evaluation using a fleet asset - ships, airplanes, submarines, networks, and/or sailors.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Fleet Experimentation	8.543	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: FLEX is a USFF/CPF collaborative effort to address fleet prioritized capability gaps, led by USFF N8/N9, supported by Navy Warfare Development Command (NWDC), and coordinated with Naval Component Commands (NCC)/Numbered Fleets, Type Commanders (TYCOM), Systems Commands (SYSCOM), OPNAV,					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604707N / *SEW Architecture/Eng Support*	**Project (Number/Name)** 3319 / *Fleet Experimentation*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Services, Coalition, and Science & Technology (S&T) community. The Fleet Experimentation program objective is to produce recommended changes in doctrine, organization, training, materiel, leadership development, personnel, facilities, and policy (DOTMLPF-P) actions. Deliverables are focused on operational and tactical warfighting capability in the near term (within the Fiscal Year Defense Plan), and prioritized by the Commander, U.S. Fleet Forces (USFF)/Commander, Pacific Fleet (CPF) Fleet Experimentation annual guidance. NWDC plans and executes USFF/CPF approved multi-year Fleet experimentation campaigns and final reports. USFF/ CPF staff manage the follow-on DOTMLPF-P actions with OPNAV, SYSCOMs, TYCOMs and Warfighter Development Command (WDC) staffs to establish or enhance warfighting capability in Integrated Air and Missile Defense (IAMD), Amphibious Warfare (AMW), Surface Warfare (SUW), Strike Warfare (STW), Anti-Submarine Warfare(ASW),Expeditionary Warfare (EXW), Information Dominance (ID), Mine Warfare (MIW) and Anti-Terrorism/Force Protection (AT/FP). - The Operational venue to experiment, demonstrate, assess warfighting CONOPS development, concepts, doctrine/training development, techniques and procedures (TTPs), and technologies - Multi-year experiment campaigns focuses on warfighting capability per CPF/CUSFFC guidance to evaluate and transition to DOTMLPF-Policy change recommendations: - Trident Warrior is the component of FLEX that specifically targets C4I systems ***FY 2016 Accomplishments:*** The FY16 FLEX ExPlan is based on four USFF/CPF directed focus areas: Multi-mission Electromagnetic Maneuver Warfare, Naval Integrated Fires, Full Spectrum Mine Warfare, and Unmanned Systems. Additionally, FLEX supported the introduction of new platform capabilities. FLEX ExPlan for FY 2016 included the following events: 1. Naval Integrated Fires (NIF) Campaign 3 Non-Kinetic War Exercise Project 3319 provided funds for Modeling and Simulation support required for the Naval Integrated Fire Control-Counter Air (NIFC-CA) From the Sea (FTS) and From the Air (FTA) Kill Chain; and NIFC-CA Collateral Capability I (N-CCI). Funds were also provided for the non-kinetic operator-in-the-loop (OITL) system wargame completed in November 2015. 2. Electromagnetic Maneuver Warfare (EMW) Experiment Campaign Project 3319 provided funds for series of EMW events to include:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604707N / *SEW Architecture/Eng Support*	**Project (Number/Name)** 3319 / *Fleet Experimentation*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Fleet Battle Experiment 2016: Funds provided for the analysis support of a Classified experiment aboard a naval vessel EMW Technical War Exercise (Spectral Tsunami 16-1): Funds were provided for the war exercise conducted 07-10 March 2016 in Quantico, VA; Classified quicklook report available via SIPRNet. KRYSTAL SPHINX (KS): Funds were provided for analysis support to examine KS effectiveness. A three-phased at-sea experiment was conducted in the vicinity of the Virginia Capes Operation Area in the W-72 corridor. Results provided to C6F to inform CONOPS/TTP. Situational Awareness System (SAwS): Funds were provided to include: Evaluation of potential electro-optic/ infrared (EO/IR) sensors, software integration with DDG81 surface search RADAR, and EO/IR sensors. TTX War Exercise: The TTX examined and refined the authorities, planning/coordination requirements, and employment considerations related to an emerging EMW capability. Funds were provided for technical and engineering, analysis, certification and accreditation, range and target support for efforts related to EMW to include Blue Emitter Vulnerability Analysis (BEVA),and High Frequency (HF) Low Probability of Intercept (LPI) limited objective experiment. 3. Logistics Force Assured C2 War Exercise Project 3319 provided funds for subject matter expertise support which examined logistics functions, processes and capabilities. The objectives and results of the war exercise are classified. 4. Trident Warrior (TW) 2016 At-Sea Experiment TW is a Fleet-directed operational experiment conducted using platforms both afloat and ashore. The systems and technologies targeted for installation aboard naval vessels are required to comply with administrative approval procedures, such as Fleet Readiness Certification Board (FRCB), and Certification and Accreditation (C&A) process. Project 3319 provided funds for the Certification and Accreditation of the nineteen approved initiatives for the 2016 Trident Warrior at-sea experiment event; and for a test facility to integrate synthetic technologies. 5. Expeditionary Fast Transport (T-EPF) At-Sea Experiment					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604707N / *SEW Architecture/Eng Support*	**Project (Number/Name)** 3319 / *Fleet Experimentation*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Project 3319 provided funds for the installation, integration, and testing of components/systems required to develop Common Operational Picture (CTP) within the Command Operations Center (COC) and sharing of data between T-EPF1 SPEARHEAD COC and an Operations Center to support the Intelligence Surveillance Reconnaissance (ISR) Adaptive Force Package (AFP) composition. Results will be incorporated into the AFP CONOPS. 6. Project 3319 provided funds for technical and subject matter expertise support throughout the experiment planning, execution, and analysis process for the following FLEX events/campaigns/wargames executing from June thru September of FY2016: -Unmanned System Series of Events -Mine Counter Measure (MCM) Exercise -VIRTUOSO War Game -Navy Tactical Data Network At-Sea Experiment -Undersea Domain Operating Concept (UDOC) At-Sea 2016 -Health Services Support Logistics War Exercise -Netted Sensor System War Exercise -Naval Mining War Exercise ***FY 2017 Plans:*** Starting in FY 2017, Fleet Experimentation is realigned to PE 0606355N Warfare Innovation Management ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	8.543	0.000	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Fleet Experimentation is a non-acquisition program.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604707N / *SEW Architecture/Eng Support*	**Project (Number/Name)** 3319 / *Fleet Experimentation*

E. Performance Metrics

Fleet Experimentation MOP:
FLEX supports approximately 100 experimental initiatives annually address fleet identified capability gaps. The majority of this funding is applied toward acquiring intellectual capital in emerging technical areas through contracts providing engineering expertise, experiment design, execution and analysis support, range support, certification and accreditation of technical capabilities, targets, and supporting air assets, and it is also used to acquire engineering and integration costs associated with conducting campaign-based experiments.

Fleet Experimentation MOE:
- CNO/CUSFF/CPF directed experiment for emerging future capability
- Mitigate critical capability gaps
- Inform Doctrine TTP, and training
- Inform Fleet Platform Wholeness or Warfighter CONOPS validation
- Impact to Fleet Warfighting within the FYDP

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy												Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0604786N *I (U)Offensive Anti-Surface Warfare Weapon Dev*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	346.011	348.708	313.109	160.694	-	160.694	64.725	0.000	0.000	0.000	0.000	1,233.247
3337: *Offensive Anti-Surface Warfare (OASuW) Weapon*	346.011	348.708	311.071	160.694	-	160.694	64.725	0.000	0.000	0.000	0.000	1,231.209
3343: *Offensive Anti-Surface Warfare (OASuW) Weapon Increment II*	0.000	0.000	2.038	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.038
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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	285.849	252.409	146.044	-	146.044
Current President's Budget	348.708	313.109	160.694	-	160.694
Total Adjustments	62.859	60.700	14.650	-	14.650
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	71.396	0.000			
• SBIR/STTR Transfer	-8.537	0.000			
• Program Adjustments	0.000	60.700	14.404	-	14.404
• Rate/Misc Adjustments	0.000	0.000	0.246	-	0.246

Change Summary Explanation

Program:
LRASM FY 2017 funding increase of $60.7M and FY 2018 increase of $25.9M to enable the program to maintain EOC schedule and fully funds the program to Milestone B certified levels.

OASuW INC 2 funding reduction of $11.5M reflects program deferment.

Schedule:
Production - LRASM FY 2017 Production Buy moved from 2QFY 2017 to 3QFY 2017.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604786N / *(U)Offensive Anti-Surface Warfare Weapon Dev*	Project (Number/Name) 3337 / *Offensive Anti-Surface Warfare (OASuW) Weapon*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3337: *Offensive Anti-Surface Warfare (OASuW) Weapon*	346.011	348.708	311.071	160.694	-	160.694	64.725	0.000	0.000	0.000	0.000	1,231.209
Quantity of RDT&E Articles		12	-	-	-	-	-	-	-	-		

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.

Decrease in FY 2016 quantities from 24 test articles to 12 production representative units for free flight test events which will be consumed during maritime environmental testing. The remaining 12 are not considered fully configured end items for the purpose of PAUC calculation.

In FY 2017, system qualification testing will complete, environmental and ship suitability testing will be conducted, flight test articles will deliver, and flight testing will commence, including the first free-flight weapon firing. Platform integration work continues.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: OASuW Development Program	348.708	311.071	160.694	0.000	160.694
Articles:	12	-	-	-	-
FY 2016 Accomplishments:					
The Integration and Test phase of the program was initiated in FY 2016, concurrently with the wrap-up of the Technology Maturation phase. The planned concurrency of these phases is required in order to meet the Early Operational Capability (EOC) fielding specified by the program requirements. Primary efforts in FY 2016 included weapon system design maturation to support completion of full system critical design review and system qualification in preparation for a Production Readiness Review in FY 2017. These efforts were supported by subsystem testing utilizing flying test beds, laboratory assets and associated software models. Additional activities included integration design/development for the launch platforms as well as procurement of test articles					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604786N / *(U)Offensive Anti-Surface Warfare Weapon Dev*	**Project (Number/Name)** 3337 / *Offensive Anti-Surface Warfare (OASuW) Weapon*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
for environmental and ship suitability qualification and subsystems for the production representative free flight weapon firings beginning in FY 2017. The program completed SETR 4.0 system design review as well as Knowledge Point 3 (tailored Milestone B). ***FY 2017 Plans:*** The Integration and Test phase of the program will continue in FY 2017. Full system qualification, environmental and initial system performance testing will complete utilizing laboratory, flying test bed, and free flight test articles. The program will complete operational flight software for B-1 integration and continue updates to F/A-18 operational flight programming. Mission planning software development for both platforms will continue. F/A-18 airworthiness testing to assess flying qualities, noise and vibration, jettison, and safe separation will also be performed in FY 2017. Performance testing will commence utilizing a flying test bed, initial free-flight weapon firing, and modeling and simulation capabilities. The program will complete a production design review (SETR 5.0) and Knowledge Point 4 in support of the procurement decision for the initial lot of EOC weapons. ***FY 2018 Base Plans:*** 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. EOC will be achieved on the B-1. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	348.708	311.071	160.694	0.000	160.694

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• WPN/2291: *LRASM*	0.000	29.643	74.733	-	74.733	74.784	75.000	0.000	0.000	0.000	254.160
• MPAF/8010: *LRASM*	0.000	60.000	45.000	-	45.000	45.000	0.000	0.000	0.000	0.000	150.000

Remarks

U.S. Navy WPN funding supports the following quantities:

FY17 - 10
FY18 - 25

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604786N / *(U)Offensive Anti-Surface Warfare Weapon Dev*	**Project (Number/Name)** 3337 / *Offensive Anti-Surface Warfare (OASuW) Weapon*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
FY19 - 25											
FY20 - 25											

U.S. Air Force MPAF funding supports the following quantities:

FY17 - 20
FY18 - 15
FY19 - 15

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, 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.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604786N / *(U)Offensive Anti-Surface Warfare Weapon Dev*	**Project (Number/Name)** 3337 / *Offensive Anti-Surface Warfare (OASuW) Weapon*

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: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604786N / *(U)Offensive Anti-Surface Warfare Weapon Dev*	**Project (Number/Name)** 3337 / *Offensive Anti-Surface Warfare (OASuW) Weapon*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	C/CPIF	Lockheed Martin Missile and Fire Control : Orlando, FL	238.638	278.717	Oct 2015	223.380	Oct 2016	112.792	Oct 2017	-		112.792	25.512	879.039	879.039
Product Development	C/CPFF	Boeing : St. Louis, MO	18.472	21.068	Oct 2015	22.494	Oct 2016	3.254	Oct 2017	-		3.254	2.481	67.769	67.769
		Subtotal	257.110	299.785		245.874		116.046		-		116.046	27.993	946.808	946.808

Remarks

FY 2018 LMCO costs includes all integration and test efforts by LMCO and associated sub-contractors to complete Knowledge Points 5, 6 and 7 and the tailored qualification/ flight test program.

FY 2018 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 B-1 and Systems Engineering Technical Review (SETR) 7.0 (USAF EOC Readiness Review).

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Support	WR	NAWC AD : Patuxent River,MD	3.396	1.050	Oct 2015	2.324	Oct 2016	2.303	Oct 2017	-		2.303	1.827	10.900	-
Government Support	WR	NAWC WD : China Lake, CA	19.663	8.578	Oct 2015	11.306	Oct 2016	10.442	Oct 2017	-		10.442	8.520	58.509	-
Government Support	WR	NSWC : Various	2.922	0.185	Nov 2015	0.291	Nov 2016	0.092	Nov 2017	-		0.092	0.063	3.553	-
Development Support	C/FFP	NSMA : Washington, DC	8.293	3.689	Dec 2015	5.570	Dec 2016	5.580	Dec 2017	-		5.580	5.662	28.794	28.794
Development Support	MIPR	USAF : Various	0.385	0.161	Oct 2015	0.425	Oct 2016	0.190	Oct 2017	-		0.190	0.000	1.161	-
Integrated Logistics Support	WR	NAWC AD : Patuxent River, MD	0.284	0.050	Oct 2015	0.171	Oct 2016	0.176	Oct 2017	-		0.176	0.182	0.863	-
Contractor Support	C/CPFF	JHU/APL : Laurel, MD	10.840	0.991	Oct 2015	0.000		0.000		-		0.000	0.000	11.831	11.831
Contractor Support	C/FFP	Schafer Corporation : Arlington, VA	8.516	5.647	Oct 2015	4.208	Oct 2016	3.719	Oct 2017	-		3.719	3.001	25.091	25.091

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604786N / *(U)Offensive Anti-Surface Warfare Weapon Dev*	**Project (Number/Name)** 3337 / *Offensive Anti-Surface Warfare (OASuW) Weapon*

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Mission Planning Support	C/CPFF	Northrup Grumman : Bethpage, NY	1.932	3.859	Oct 2015	3.797	Oct 2016	0.400	Oct 2017	-		0.400	0.200	10.188	10.188
Contractor Support	Various	Various : Various	5.924	1.555	Oct 2015	0.639	Oct 2016	0.717	Oct 2017	-		0.717	1.431	10.266	10.266
Development Support	Various	NRL : Various	0.000	0.691	Nov 2015	0.885	Nov 2016	0.575	Nov 2017	-		0.575	0.143	2.294	2.294
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	64.955	26.456		29.616		24.194		-		24.194	21.029	166.250	-

Remarks

FY 2018 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 Program Readiness Review (PRR), Knowledge Points 5 and 6 the developmental test program, the Quick Reaction Assessment (QRA), and tactics development supporting EOC.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Support	WR	NAWC WD : China Lake, CA	8.017	10.909	Oct 2015	15.224	Oct 2016	13.180	Oct 2017	-		13.180	2.653	49.983	-
Development Support	WR	NAWC AD : Patuxent River, MD	3.083	8.038	Oct 2015	13.082	Oct 2016	3.071	Oct 2017	-		3.071	0.110	27.384	-
Development Support	WR	NSWC : Various	0.064	0.067	Nov 2015	0.210	Nov 2016	0.079	Nov 2017	-		0.079	0.081	0.501	-
Development Support	WR	COTF : Norfolk, VA	0.105	0.002	Oct 2015	0.100	Oct 2016	0.000		-		0.000	0.000	0.207	-
Development Support	MIPR	USAF : Various	0.290	1.082	Oct 2015	3.930	Oct 2016	1.106	Oct 2017	-		1.106	0.072	6.480	-
Wind Tunnel Testing	MIPR	AEDC : Arnolds AFB, TN	4.153	0.000		0.000		0.000		-		0.000	0.000	4.153	-
		Subtotal	15.712	20.098		32.546		17.436		-		17.436	2.916	88.708	-

Remarks

FY 2018 Test and Evaluation costs support flight testing, system qualifications, range time, and target costs needed for the B-1 and F/A-18 E/F to support PRR, Knowledge Points 5 and 6, the developmental test program, and the Quick Reaction Assessment (QRA).

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604786N / *(U)Offensive Anti-Surface Warfare Weapon Dev*	Project (Number/Name) 3337 / *Offensive Anti-Surface Warfare (OASuW) Weapon*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Support	WR	NAWC AD : Patuxent River, MD	4.376	1.283	Oct 2015	1.275	Oct 2016	1.311	Oct 2017	-		1.311	1.005	9.250	-
Government Support	WR	NAWC WD : China Lake, CA	1.768	0.851	Oct 2015	1.260	Oct 2016	1.207	Oct 2017	-		1.207	0.990	6.076	-
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	0.490	0.235	Oct 2015	0.500	Oct 2016	0.500	Oct 2017	-		0.500	0.300	2.025	-
		Subtotal	8.234	2.369		3.035		3.018		-		3.018	2.295	18.951	-

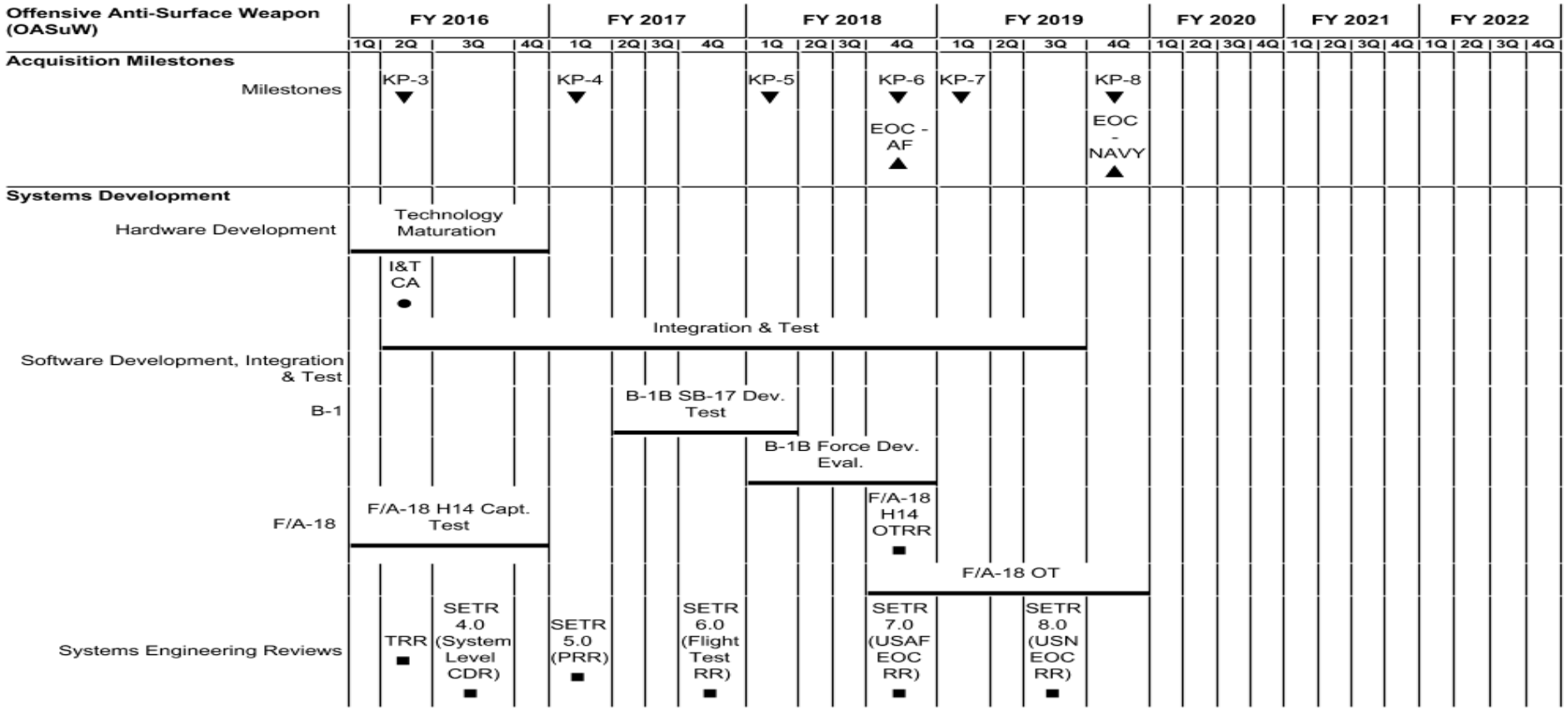
Remarks

FY 2018 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 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	346.011	348.708		311.071		160.694		-		160.694	54.233	1,220.717	-

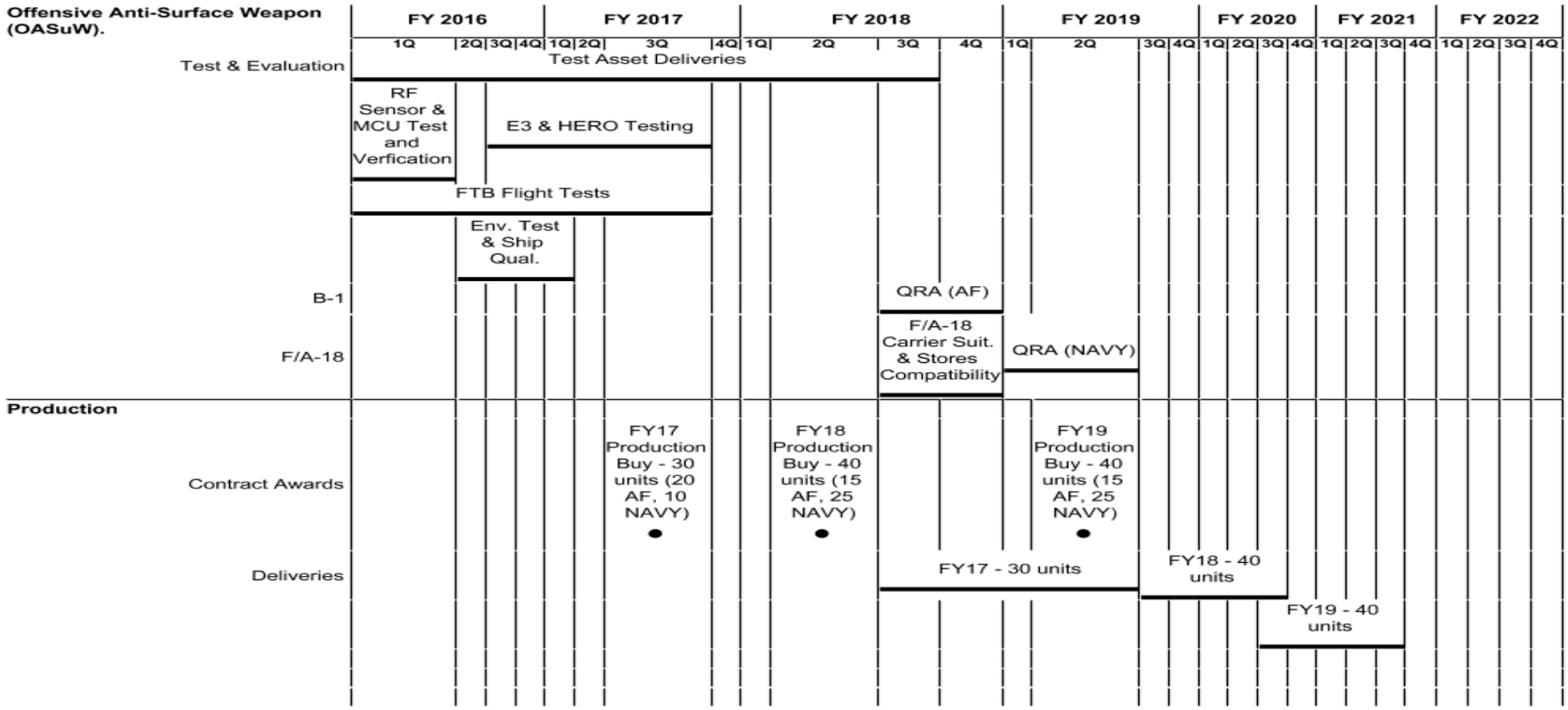
Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604786N / *(U)Offensive Anti-Surface Warfare Weapon Dev*	**Project (Number/Name)** 3337 / *Offensive Anti-Surface Warfare (OASuW) Weapon*



2018PB - 0604786N - 3337

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604786N / *(U)Offensive Anti-Surface Warfare Weapon Dev*	**Project (Number/Name)** 3337 / *Offensive Anti-Surface Warfare (OASuW) Weapon*



2018PB - 0604786N - 3337

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604786N / *(U)Offensive Anti-Surface Warfare Weapon Dev*	**Project (Number/Name)** 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 3	2	2016	2	2016
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: Technology Maturation	1	2016	4	2016
Systems Development: Hardware Development: Integration & Test Contract Award	2	2016	2	2016
Systems Development: Hardware Development: Integration & Test	2	2016	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 Captive Carriage Test	1	2016	4	2016
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 4.0 (System Level Critical Design Review)	3	2016	3	2016
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

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604786N / *(U)Offensive Anti-Surface Warfare Weapon Dev*	**Project (Number/Name)** 3337 / *Offensive Anti-Surface Warfare (OASuW) Weapon*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
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
Systems Development: Systems Engineering Reviews: Technical Readiness Review	2	2016	2	2016
Offensive Anti-Surface Weapon (OASuW).				
Test & Evaluation: Test Asset Deliveries	1	2016	3	2018
Test & Evaluation: E3 & HERO Testing	3	2016	3	2017
Test & Evaluation: RF Sensor and MCU Testing and Verification	1	2016	1	2016
Test & Evaluation: Flying Test Bed Flight Tests	1	2016	3	2017
Test & Evaluation: Environmental Test & Ship Qualification	2	2016	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 - 30 units (20 AF, 10 NAVY)	3	2017	3	2017
Production: Contract Awards: FY18 Production Buy - 40 units (15 AF, 25 NAVY)	2	2018	2	2018
Production: Contract Awards: FY19 Production Buy - 40 units (15 AF, 25 NAVY)	2	2019	2	2019
Production: Deliveries: FY17 Deliveries - 30 units	3	2018	2	2019
Production: Deliveries: FY18 Deliveries - 40 units	3	2019	3	2020
Production: Deliveries: FY19 Deliveries - 40 units	3	2020	3	2021

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604786N / *(U)Offensive Anti-Surface Warfare Weapon Dev*	Project (Number/Name) 3343 / *Offensive Anti-Surface Warfare (OASuW) Weapon Increment II*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3343: *Offensive Anti-Surface Warfare (OASuW) Weapon Increment II*	0.000	0.000	2.038	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.038
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Update of Analysis of Alternatives (AoA) for OASuW Increment 2 (OASuW-2) capabilities.

The OASuW-2 will address future threats by 2024 to replace or update legacy weapons while in support of the Department of the Navy (DoN) Next Generation Strike Capability (NGSC). Within NGSC, OASuW-2 will be an air launched offensive weapon system to address capability needs beginning in 2024. The 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.

The OAWSuW-2 program was deferred in FY 2018.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Analysis of Alternatives	0.000	2.038	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2016 Accomplishments: N/A					
FY 2017 Plans: Funding supports analysis required for system specification development and Acquisition Strategy development.					
FY 2018 Base Plans: N/A					
FY 2018 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	0.000	2.038	0.000	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604786N / *(U)Offensive Anti-Surface Warfare Weapon Dev*	**Project (Number/Name)** 3343 / *Offensive Anti-Surface Warfare (OASuW) Weapon Increment II*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

System specification development

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0605812M *I (U)Joint Light Tactical Vehicle(JLTV) EMD*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	94.900	24.790	23.197	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	142.887
3209: *Joint Light Tactical Vehicle*	94.900	24.790	23.197	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	142.887

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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	32.149	23.197	7.873	-	7.873
Current President's Budget	24.790	23.197	0.000	-	0.000
Total Adjustments	-7.359	0.000	-7.873	-	-7.873
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-6.198	0.000			
• SBIR/STTR Transfer	-1.161	0.000			
• Program Adjustments	0.000	0.000	-7.873	-	-7.873
• Rate/Misc Adjustments	0.000	0.000	0.000	-	0.000

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0605812M / *(U)Joint Light Tactical Vehicle(JLTV) EMD*	Project (Number/Name) 3209 / *Joint Light Tactical Vehicle*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3209: *Joint Light Tactical Vehicle*	94.900	24.790	23.197	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	142.887
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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Live Fire Test Assets	10.009	5.041	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: Contract and support for development, fabrication, Field Service Representative (FSR) support, and delivery of vehicles and equipment required for LF Test events.					
FY 2016 Accomplishments: - Continued efforts to support the fabrication of LF test assets that will be destroyed during testing and continue Field Service Representative support for LF testing. -Continued vendor RDT&E activity on the LRIP contract. -Initiated ramp-up of test program to include planning and coordination with government test agencies, requirements definition with Operational Test Authority, and review of test requirements with vendor in accordance with the Test and Evaluation Master Plan (TEMP).					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0605812M / *(U)Joint Light Tactical Vehicle(JLTV) EMD*	**Project (Number/Name)** 3209 / *Joint Light Tactical Vehicle*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
-Initiated efforts to support planned test events to include FUSL, Logistics Demonstration, AFES, C4I, corrosion, and ballistic cab/coupon tests. ***FY 2017 Plans:*** -Continue vendor efforts in support of LF testing. -Continue vendor RDT&E activity on the LRIP contract. -Continue logistics support of Government Furnished Equipment (GFE) that will be required for LF test events. -Continue efforts to support planned test events to include FUSL, Logistics Demonstration, AFES, C4I, corrosion, and ballistic cab/coupon tests. ***FY 2018 Base Plans:*** -Funding for the JLTV program transitions to PE 0605813M beginning FY18. ***FY 2018 OCO Plans:*** N/A					
Title: GFE, ILS, Facilities Documentation/Analysis and Support Engineering ***Articles:*** ***FY 2016 Accomplishments:*** -Completed the procurement of GFE required to support the engineering, development, and integration for testing. -Initiated systems integration activities in support of LF test and systems development at the Government Systems Integration Laboratory (GSIL). ***FY 2017 Plans:*** -Continue systems integration activities in support of LF test and systems development at the GSIL. ***FY 2018 Base Plans:*** -Funding for the JLTV program transitions to PE 0605813M beginning FY18. ***FY 2018 OCO Plans:*** N/A	4.569 -	1.500 -	0.000 -	0.000 -	0.000 -
Title: Test and Evaluation Events and Analysis ***Articles:*** ***FY 2016 Accomplishments:*** -Completed development of the LRIP test planning documents; TEMP approved 8 July 2016.	8.399 -	14.658 -	0.000 -	0.000 -	0.000 -

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0605812M / *(U)Joint Light Tactical Vehicle(JLTV) EMD*	**Project (Number/Name)** 3209 / *Joint Light Tactical Vehicle*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
-Initiated LRIP test program to include (but not limited to) FUSL, AFES, ballistic, corrosion, performance, and RAM. ***FY 2017 Plans:*** -Continue activity in accordance with the program TEMP to include FUSL, AFES, Log Demo, C4I, corrosion, and ballistic cab/coupon tests. -Complete corrosion and ballistic cab/coupon tests. -Initiate Live Fire test. -Initiate Physical Configuration Audit (PCA) ***FY 2018 Base Plans:*** -Funding for the JLTV program transitions to PE 0605813M beginning FY18. ***FY 2018 OCO Plans:*** N/A					
Title: Program Management Support ***Articles:***	1.813 -	1.998 -	0.000 -	0.000 -	0.000 -
FY 2016 Accomplishments: -Initiated support for LRIP activity to include program management for test events, GFE management, monitoring and execution of the LRIP contract, and monitoring of vendor performance during LF testing. ***FY 2017 Plans:*** -Continue support for LRIP activity such as program management for test events, GFE management, monitoring and execution of the LRIP contract, and monitoring of vendor performance during LF testing. ***FY 2018 Base Plans:*** -Funding for the JLTV program transitions to PE 0605813M beginning FY18. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	24.790	23.197	0.000	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0605812M / *(U)Joint Light Tactical Vehicle(JLTV) EMD*	**Project (Number/Name)** 3209 / *Joint Light Tactical Vehicle*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• PMC/5095: *0605812M- JLTV*	58.578	113.230	233.639	-	233.639	665.477	739.211	469.511	532.720	Continuing	Continuing
• OPA/D15603: *JLTV (Army)*	249.911	587.514	805.058	-	805.058	1,079.789	1,100.567	1,136.743	1,169.725	Continuing	Continuing
• RDTEA/VU9: *0605812A-JLTV (Army)*	32.486	11.530	23.522	-	23.522	2.905	2.971	1.967	0.000	Continuing	Continuing
• RDT&E/0605813M: *Joint Light Tactical Vehicle (Sys Dev & Dem)*	0.000	0.000	20.710	-	20.710	2.280	2.135	0.000	0.000	0.000	25.125

Remarks

Joint Program Live Fire Test Asset/LRIP contract awarded 25 Aug 2015.

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.

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: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0605812M / *(U)Joint Light Tactical Vehicle(JLTV) EMD*	Project (Number/Name) 3209 / *Joint Light Tactical Vehicle*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Years Cumulative Funding	Various	Various : Various	38.353	0.000		0.000		0.000		-		0.000	0.000	38.353	-
Live Fire Test Assets	C/FFP	Oshkosh : Oshkosh, WI	4.280	10.009	Feb 2016	5.041	Dec 2016	0.000		-		0.000	0.000	19.330	Continuing
		Subtotal	42.633	10.009		5.041		0.000		-		0.000	0.000	57.683	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
GFE	Various	Various : Various	0.628	4.569	Jul 2016	0.000		0.000		-		0.000	0.000	5.197	-
Prior Years Cumulative Funding	Various	Various : Various	3.278	0.000		0.000		0.000		-		0.000	0.000	3.278	-
System Integration	MIPR	SSC-A : Charleston, SC	0.000	0.000		1.500	Feb 2017	0.000		-		0.000	0.000	1.500	-
		Subtotal	3.906	4.569		1.500		0.000		-		0.000	0.000	9.975	-

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 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	6.576	1.010	Jan 2016	1.153	Jan 2017	0.000		-		0.000	0.000	8.739	-
Prior Years Cumulative Funding	Various	Various : Various	14.813	0.000		0.000		0.000		-		0.000	0.000	14.813	-
Developmental Test & Evaluation (Performance, RAM, Ballistic, Report Generation)	MIPR	Govt Proving Grounds : Various	7.029	0.479	Apr 2016	4.100	Jan 2017	0.000		-		0.000	0.000	11.608	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0605812M / *(U)Joint Light Tactical Vehicle(JLTV) EMD*	**Project (Number/Name)** 3209 / *Joint Light Tactical Vehicle*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Operational Testing (Planning, Conduct, Evaluation and Report Generation)	MIPR	Govt Proving Grounds : Various	3.165	0.000	Apr 2016	4.896	Jan 2017	0.000		-		0.000	0.000	8.061	-
Developmental Test & Evaluation (Oversight)	WR	MCOTEA : Quantico, VA	0.776	0.448	Feb 2016	0.200	Jan 2017	0.000		-		0.000	0.000	1.424	-
Live Fire Test & Evaluation	MIPR	ATC : Aberdeen, MD	2.061	5.149	Jan 2016	3.829	Jan 2017	0.000		-		0.000	0.000	11.039	-
Developmental Test & Evaluation	C/FFP	CORVID : Moorsville, NC	0.000	1.313	May 2016	0.480	May 2017	0.000		-		0.000	0.000	1.793	-
		Subtotal	34.420	8.399		14.658		0.000		-		0.000	0.000	57.477	-

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 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	1.340	1.568	Jan 2016	1.548	Oct 2016	0.000		-		0.000	0.000	4.456	-
Program Management Support	C/CPFF	CECOM/MITRE : Aberdeen Proving Ground, MD	1.053	0.077	Mar 2016	0.150	Oct 2016	0.000		-		0.000	0.000	1.280	-
Travel	Various	MCSC : Quantico, VA	0.719	0.168	Oct 2015	0.300	Oct 2016	0.000		-		0.000	0.000	1.187	-
		Subtotal	13.941	1.813		1.998		0.000		-		0.000	0.000	17.752	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	94.900	24.790		23.197		0.000		-		0.000	0.000	142.887	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0605812M / *(U)Joint Light Tactical Vehicle(JLTV) EMD*	**Project (Number/Name)** 3209 / *Joint Light Tactical Vehicle*

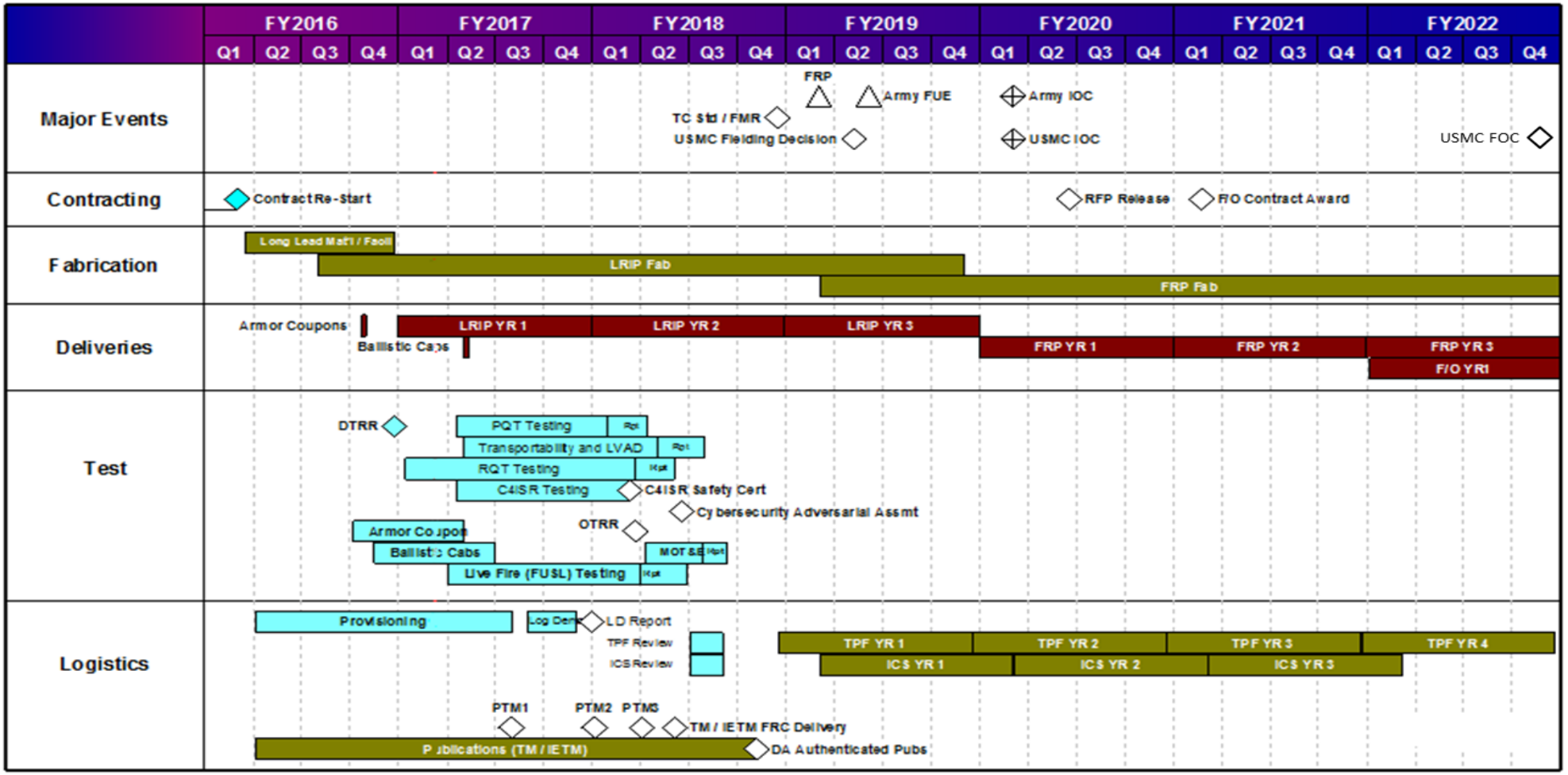

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0605812M / *(U)Joint Light Tactical Vehicle(JLTV) EMD*	**Project (Number/Name)** 3209 / *Joint Light Tactical Vehicle*

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	2	2018
Logistics Demonstration	3	2017	4	2017
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: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0303354N *I ASW Systems Development - MIP*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	26.708	9.835	9.110	8.278	-	8.278	8.967	9.084	9.267	9.452	Continuing	Continuing
0490: *Airborne Acoustic Intelligence (AAI)*	26.708	9.835	9.110	8.278	-	8.278	8.967	9.084	9.267	9.452	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	9.835	9.110	8.336	-	8.336
Current President's Budget	9.835	9.110	8.278	-	8.278
Total Adjustments	0.000	0.000	-0.058	-	-0.058
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Rate/Misc Adjustments	0.000	0.000	-0.058	-	-0.058

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0303354N *I ASW Systems Development - MIP*

Change Summary Explanation

Technical: Not Applicable

Schedule: Not Applicable

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0303354N / *ASW Systems Development - MIP*	Project (Number/Name) 0490 / *Airborne Acoustic Intelligence (AAI)*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0490: *Airborne Acoustic Intelligence (AAI)*	26.708	9.835	9.110	8.278	-	8.278	8.967	9.084	9.267	9.452	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Systems Engineering / Aircraft Mods Active Acoustic Program	1.767	1.670	1.551	0.000	1.551
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Engineering support of Acoustic Intelligence (ACINT) Collection Suites for certified AAI collection platforms and management of full spectrum database. Continued upgrades for unique airborne avionics and post mission processing capabilities for ACINT/MASINT (Measurement and Signature Intelligence) requirements. Science and technology research in development of new systems. Field ACS kits in support of P-8A deployments.					
FY 2017 Plans: Engineering support of Acoustic Intelligence (ACINT) Collection Suites for certified AAI collection platforms and management of full spectrum database. Continued upgrades for unique airborne avionics and post mission					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0303354N / *ASW Systems Development - MIP*	**Project (Number/Name)** 0490 / *Airborne Acoustic Intelligence (AAI)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
processing capabilities for ACINT/MASINT (Measurement and Signature Intelligence) requirements. Science and technology research in development of new systems. Field ACS kits in support of P-8A deployments. ***FY 2018 Base Plans:*** 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 2018 OCO Plans:*** N/A					
Title: Data Collection and Analysis	1.064	1.085	1.035	0.000	1.035
Articles:	-	-	-	-	-
FY 2016 Accomplishments: 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. ***FY 2017 Plans:*** 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. ***FY 2018 Base Plans:*** 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					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0303354N / *ASW Systems Development - MIP*	**Project (Number/Name)** 0490 / *Airborne Acoustic Intelligence (AAI)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
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. ***FY 2018 OCO Plans:*** N/A					
Title: Active Measurement Validation ***Articles:*** ***FY 2016 Accomplishments:*** 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. ***FY 2017 Plans:*** 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. ***FY 2018 Base Plans:*** 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. ***FY 2018 OCO Plans:*** N/A	0.150 -	0.150 -	0.138 -	0.000 -	0.138 -
Title: Navy Underwater Active Multiple Ping (NUAMP) Product Development ***Articles:*** ***FY 2016 Accomplishments:*** Complete full qualification and certification efforts for the initial Navy Underwater Active Multiple Ping (NUAMP) sonic frequencies. Continue sonic frequency design, development, integration and test for additional sonic frequencies of the NUAMP sonobuoy family. ***FY 2017 Plans:***	6.854 -	6.205 -	5.554 -	0.000 -	5.554 -

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0303354N / *ASW Systems Development - MIP*	**Project (Number/Name)** 0490 / *Airborne Acoustic Intelligence (AAI)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Complete full qualification and certification efforts for the second Navy Underwater Active Multiple Ping (NUAMP) sonic frequencies. Continue sonic frequency design, development, integration and test for additional sonic frequencies of the NUAMP sonobuoy family. ***FY 2018 Base Plans:*** Continue sonic frequency design, development, integration and test for additional sonic frequencies of the NUAMP sonobuoy family. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	9.835	9.110	8.278	0.000	8.278

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-2, RDT&E Budget Item Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0304240M *I (U)Advanced Tactical Unmanned Aircraft System*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	0.000	0.000	0.000	7.979	-	7.979	10.385	5.979	7.974	7.970	Continuing	Continuing
3135: *USMC MUX Medium Altitude - Long Endurance (MALE) Group 5 UAV*	0.000	0.000	0.000	4.978	-	4.978	5.485	5.979	7.974	7.970	Continuing	Continuing
3427: *KMAX Experimentation and Support*	0.000	0.000	0.000	3.001	-	3.001	4.900	0.000	0.000	0.000	0.000	7.901

A. Mission Description and Budget Item Justification

This is an FY18 new start for project units 3135 and 3427.

This program element provides for development and capability requirements for Advanced Tactical Unmanned Aerial Vehicles. 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. The MUX efforts will inform a future program of record.

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.

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: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0304240M *I (U)Advanced Tactical Unmanned Aircraft System*

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	7.979	-	7.979
Total Adjustments	0.000	0.000	7.979	-	7.979
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Program Adjustments	0.000	0.000	7.978	-	7.978
• Rate/Misc Adjustments	0.000	0.000	0.001	-	0.001

Change Summary Explanation

Schedule:
Project 3135 - Establishes the MUX project unit.
Project 3427 - Establishes the CQ-24A Cargo UAS project unit.

Technical: Not applicable

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0304240M / *(U)Advanced Tactical Unmanned Aircraft System*	Project (Number/Name) 3135 / *USMC MUX Medium Altitude - Long Endurance (MALE) Group 5 UAV*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3135: *USMC MUX Medium Altitude - Long Endurance (MALE) Group 5 UAV*	0.000	0.000	0.000	4.978	-	4.978	5.485	5.979	7.974	7.970	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Funding 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. The MUX system Initial Capabilities Document (ICD) was approved Oct 2016. The Material Development Decision and Analysis of Alternatives (AOA) is planned to start in FY18. The future MUX UAV system will provide a multi-mission, weaponized, 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.

This effort will inform program scope and phasing for development of the MUX capability that will be part of a future Program of Record (POR), supporting Expeditionary Force 21 Operating Concepts, as an advanced, multi-mission platform in support of a Marine Expeditionary Force/Marine Expeditionary Brigade-sized MAGTF and addressing future capability
gaps.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: MUX Studies, Analysis, Experimentation and Concept Refinement	0.000	0.000	3.650	0.000	3.650
Articles:	-	-	-	-	-
FY 2016 Accomplishments: N/A					
FY 2017 Plans: N/A					
FY 2018 Base Plans: 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					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0304240M / *(U)Advanced Tactical Unmanned Aircraft System*	**Project (Number/Name)** 3135 / *USMC MUX Medium Altitude - Long Endurance (MALE) Group 5 UAV*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
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-24 Cargo UAS and DARPA/ONR developed Tactical Expeditionary Reconnaissance Node (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, 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. ***FY 2018 OCO Plans:*** N/A					
Title: Technical and Engineering Services ***Articles:*** ***FY 2016 Accomplishments:*** N/A ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** Initiate and provide Government Engineering support, Contractor support, Program support and travel for execution of MUX Studies, Experimentation, and Concept Refinement and for pre-MS A related acquisition activities to support the future MUX program of record. ***FY 2018 OCO Plans:*** N/A	0.000 -	0.000 -	1.328 -	0.000 -	1.328 -
Accomplishments/Planned Programs Subtotals	0.000	0.000	4.978	0.000	4.978

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0304240M / *(U)Advanced Tactical Unmanned Aircraft System*	**Project (Number/Name)** 3135 / *USMC MUX Medium Altitude - Long Endurance (MALE) Group 5 UAV*

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, 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 the technology base through industry inquiries and study contracts will be used to determine material solutions that are capable of meeting MUX requirements and Initial Operational Capability (IOC)
needs. 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 - a business case analysis will help inform the level of government involvement required to maximize cost savings.

E. Performance Metrics

Performance metrics include successful completion of Trade Studies; successful development of a CONOPS and draft Capability Development Document, identification of material solutions for concept refinement, and analysis of architectures.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0304240M / *(U)Advanced Tactical Unmanned Aircraft System*	Project (Number/Name) 3427 / *KMAX Experimentation and Support*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3427: *KMAX Experimentation and Support*	0.000	0.000	0.000	3.001	-	3.001	4.900	0.000	0.000	0.000	0.000	7.901
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Funding provides for experimentation for unmanned cargo operations and includes complimentary 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, and flying to locations that present dangerous or deadly conditions to humans (such as biological threats or radiation hazards).

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: CQ-24A Cargo UAS Experimentation and Support Services	0.000	0.000	2.091	0.000	2.091
Articles:	-	-	-	-	-
FY 2016 Accomplishments: N/A					
FY 2017 Plans: N/A					
FY 2018 Base Plans: 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 MUX. 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 2018 OCO Plans: N/A					
Title: Technical and Engineering Services	0.000	0.000	0.910	0.000	0.910
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0304240M / *(U)Advanced Tactical Unmanned Aircraft System*	**Project (Number/Name)** 3427 / *KMAX Experimentation and Support*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
FY 2016 Accomplishments: N/A ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** 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. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.000	0.000	3.001	0.000	3.001

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 FY18/FY19 to align with the MUX program of record concept refinement phase.

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.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0304270N *I Electronic Warfare Development - MIP*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	3.951	0.580	0.437	0.527	-	0.527	0.519	0.527	0.539	0.549	Continuing	Continuing
2260: *Specific Emitter ID*	3.951	0.580	0.437	0.527	-	0.527	0.519	0.527	0.539	0.549	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.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	0.580	0.437	0.481	-	0.481
Current President's Budget	0.580	0.437	0.527	-	0.527
Total Adjustments	0.000	0.000	0.046	-	0.046
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Rate/Misc Adjustments	0.000	0.000	0.046	-	0.046

Change Summary Explanation

Technical: Not applicable.

Schedule: Not applicable.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0304270N / *Electronic Warfare Development - MIP*	Project (Number/Name) 2260 / *Specific Emitter ID*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2260: *Specific Emitter ID*	3.951	0.580	0.437	0.527	-	0.527	0.519	0.527	0.539	0.549	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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: SENSOR FUSION	0.187	0.135	0.145	0.000	0.145
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.					
FY 2016 Accomplishments: - Continued 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.					
FY 2017 Plans: - Continue all efforts of FY 2016, unless noted as completed above. - Initiate task to expand and improve ELectronic INTelligence (ELINT) information that will aid SEI signal processing, analysis, and deinterleaving.					
FY 2018 Base Plans: - Continue all efforts of FY 2017, unless noted as completed above.					
FY 2018 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0304270N / *Electronic Warfare Development - MIP*	**Project (Number/Name)** 2260 / *Specific Emitter ID*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A					
Title: SYSTEM AUTOMATION	0.201	0.153	0.166	0.000	0.166
Articles:	-	-	-	-	-
Description: This effort supports development of an autonomous surveillance system capable of providing emitter signal information to a central location. ***FY 2016 Accomplishments:*** - Continued all task to develop an unmanned, autonomous, remote collection and surveillance system. - Continued task to automate fusion of other sensor information with Specific Emitter Identification (SEI) data collection. ***FY 2017 Plans:*** - Continue all efforts of FY 2016, unless noted as completed above. - Complete task to automate fusion of other sensor information with SEI data collection. ***FY 2018 Base Plans:*** - Continue all efforts of FY 2017, unless noted as completed above. ***FY 2018 OCO Plans:*** N/A					
Title: TECHNOLOGY REFRESH & COMMUNICATION ENHANCEMENT	0.192	0.149	0.216	0.000	0.216
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. The increase between FY17 and FY18 is due to planned SEI software enhancements to address mission needs and requirements. ***FY 2016 Accomplishments:*** - Continued task to incorporate other Specific Emitter Identification (SEI) algorithms into deployed processing software.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0304270N / *Electronic Warfare Development - MIP*	**Project (Number/Name)** 2260 / *Specific Emitter ID*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Continued 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. - Continued task to expand collection capability to support additional radar types. - Completed task to incorporate further message reporting formats for dissemination of SEI data and improve SEI interoperability. - Initiated task to provide software enhancements to improve SEI system performance based on mission needs and requirements, user inputs, and platform environment. ***FY 2017 Plans:*** - Continue all efforts of FY 2016, unless noted as completed above. ***FY 2018 Base Plans:*** - Continue all efforts of FY 2017, unless noted as completed above. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.580	0.437	0.527	0.000	0.527

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Not applicable.

E. Performance Metrics

MIP Program.