Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
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 0604029N *I (U)Unmanned Undersea Vehicle Core Technologies*

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	0.000	0.000	27.483	54.376	-	54.376	52.704	42.516	39.625	40.174	Continuing	Continuing
3393: *UxS Autonomy, C2,*	0.000	0.000	12.353	8.563	-	8.563	6.640	4.063	5.674	5.787	Continuing	Continuing
3395: *UxS Payloads*	0.000	0.000	8.080	16.565	-	16.565	10.420	7.280	8.991	9.171	Continuing	Continuing
3396: *UxS Endurance*	0.000	0.000	7.050	16.782	-	16.782	23.266	21.484	19.651	19.745	Continuing	Continuing
4053: *UxS Platform*	0.000	0.000	0.000	12.466	-	12.466	12.378	9.689	5.309	5.471	Continuing	Continuing

Note

FY 2018 and prior funding in Program Element (PE) 0604536N. Projects moved from PE 0604536N starting in FY 2019. FY 2020 establishes new project descriptions that focus on the key enabling technology areas in support of the entire UUV Family of Systems (FoS).

A. Mission Description and Budget Item Justification

In order to accelerate future capabilities and support steady growth of the Navy's Unmanned Undersea Vehicle (UUV) Family of Systems (FoS), UUV Core Technologies will: Drive standardization across the UUV family of systems; Enable Fleet learning and experimentation via Industry involvement and capability demonstrations; Transition mature technologies from the Science and Technology communities and Industry that are aligned to Fleet priorities. This Program Element leverages ONR, DARPA, and Industry technology development efforts in the key areas of autonomy, communications, command and control (C2), precision navigation, endurance and energy, payload integration, and host ship/submarine integration and launch and recovery.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	0.000	30.187	59.523	-	59.523
Current President's Budget	0.000	27.483	54.376	-	54.376
Total Adjustments	0.000	-2.704	-5.147	-	-5.147
• Congressional General Reductions	-	-0.081			
• Congressional Directed Reductions	-	-2.623			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Program Adjustments	0.000	0.000	-5.147	-	-5.147

Change Summary Explanation

Program Changes:

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
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 0604029N *I (U)Unmanned Undersea Vehicle Core Technologies*

FY18 - No Changes
FY19 - -$2,623K Congressional reductions ($330K Project 3393 Unjustified Growth; $635K Project 3395 Concurrency; $1,658K Project 3396 Concurrency), $81K FFRDC reduction
FY20 - -$5,147K UUV portfolio rebalance
Technical: Not applicable.
Schedule: Not applicable.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319 / 4					R-1 Program Element (Number/Name) PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*				Project (Number/Name) 3393 / *UxS Autonomy, C2,*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
3393: *UxS Autonomy, C2,*	0.000	0.000	12.353	8.563	-	8.563	6.640	4.063	5.674	5.787	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

FY 2018 and prior funding in Program Element (PE) 0604536N. Project moved from PE 0604536N starting in FY 2019. Project renamed UxS Autonomy, C2 starting in FY20 (previously titled Adv Undersea Prototyping-Remote Command & Control in FY19 and prior years).

A. Mission Description and Budget Item Justification

The Autonomy and Command and Control (C2) portion of this project funds efforts to develop common standards, interfaces, and systems to support cross-domain applications. These efforts include advanced development, prototyping and demonstrations to accelerate the design and development of system commonality and interoperability for the cross-domain (Surface and Sub-Surface, Aviation and Ground) requirements of the Navy.

Coordinating with the Common Control System (CCS) where applicable, autonomy development efforts will demonstrate scalable, adaptable and interoperable warfighting capabilities across various unmanned systems. The advanced development emphasis will encourage innovation and enable rapid integration of UxS capabilities across domains while common standards, interfaces, and systems development occurs in parallel. Autonomy and C2 architectures and interface definitions will be incorporated into near-term and future UUV requests for proposals (RFP) to drive contractor development efforts.

In summary, coordinated autonomy and C2 efforts will define, develop and demonstrate capability that advance new technology, hardware and software of control systems that will be used to operate multiple and dissimilar Naval UxSs.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Product Development	0.000	10.123	7.067	0.000	7.067
Articles:	-	-	-	-	-
FY 2019 Plans: Autonomy: Complete and publish Architecture Design Document and continue interface documents development and delivery. Commence development of modeling and simulation and autonomy software development. Continue cybersecurity safety and standards review with Navy and Industry partners. Initiate an autonomy lab to test and integrate autonomy solutions. C2: Complete and publish Architecture Design Document. Complete requirements analysis in support of Requests for Proposals (RFPs). Commence modeling and simulation. Begin extension of Common Control System (CCS) to the maritime domain. Define interface requirements and software components for command and control of UUVs to be implemented in specifications on future UUV programs and inserted into future					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	**Project (Number/Name)** 3393 / *UxS Autonomy, C2,*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
phases of current UUV programs. Continue coordination and integration with UUV Homeport and UUV Operations Center (UOC) at the Naval Undersea Warfare Center Keyport in support of UUV operations. Survey communications and autonomy technologies, identify gaps, strategize future investments to overcome limitations. ***FY 2020 Base Plans:*** Autonomy: Update standards and Interface Control Documents as needed, and continue Cyber/Safety/ Standards development. Investigate autonomy metrics and tech insertion process. Demonstrate autonomy software integration with a UUV using simulation and in-water test. Continue support of autonomy lab standup. C2: Update models for CCS software extensions and begin detailed design of CCS implementation into first UUV program. Continue coordination and integration efforts at UUV Homeport and UOC. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY 2019 to FY 2020 decrease due to reconfiguration of Core Technology projects.					
Title: Support	0.000	1.780	1.194	0.000	1.194
Articles:	-	-	-	-	-
FY 2019 Plans: Autonomy: Update documentation and continue work on development of common autonomy standards, interfaces, and systems; support modeling/simulation efforts and test bed development. Incorporate standards, interface requirements into RFPs. C2: Update CCS documentation and support testing and design efforts. Incorporate standards, interface requirements into RFPs. ***FY 2020 Base Plans:*** Autonomy: Update documentation and continue work to integrate common autonomy standards, interfaces, and systems; support modeling/simulation efforts and test bed development. C2: Update CCS documentation and continue to support development and implementation efforts. ***FY 2020 OCO Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	**Project (Number/Name)** 3393 / *UxS Autonomy, C2,*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Slight decrease from FY 2019 to FY 2020 due to efficiencies in coordination of autonomy and common control efforts.					
Title: Management Services	0.000	0.450	0.302	0.000	0.302
Articles:	-	-	-	-	-
FY 2019 Plans: Autonomy: Provide guidance, project planning, financial and contracting support, and coordination for development of common autonomy standards, interfaces, systems, and common control efforts. C2: Provide guidance, project planning, financial and contracting support, and coordination of Common Control System (CCS) analysis and implementation. ***FY 2020 Base Plans:*** Autonomy: Continue guidance, project planning, financial and contracting support, and coordination of common autonomy standards, interfaces, and systems. C2: Continue guidance, project planning, financial and contracting support, and coordination of CCS analysis and implementation. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Slight decrease from FY 2019 to FY 2020 due to efficiencies in coordination of autonomy and common control efforts.					
Accomplishments/Planned Programs Subtotals	0.000	12.353	8.563	0.000	8.563

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	**Project (Number/Name)** 3393 / *UxS Autonomy, C2,*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• RDTEN/0604536N/3393: *Adv Undersea Prototyping-Remote Command & Control*	2.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	3.486

Remarks

Funding moved to new Program Element (PE) 0604029N in FY 2019.

D. Acquisition Strategy

UUV Core Technology efforts will accelerate future capabilities and support steady growth of the Navy's Unmanned Undersea Vehicle (UUV) Family of Systems (FoS). UUV Core Technologies will: drive standardization across the UUV FoS; enable Fleet learning and experimentation via industry involvement and capability demonstrations;
and transition mature technologies from the Science and Technology communities and Industry of which are aligned to Fleet priorities. The program will leverage existing efforts from the Naval Research and Development Enterprise and will utilize rapid contracting approaches such as the Naval Undersea Warfare Center (NUWC) Newport UUV Family of Systems multi-award Indefinite Delivery Indefinite Quantity contract to facilitate Industry involvement. Coordination with UxS platforms will eliminate redundant efforts, encourage innovation, and improve coordination of unmanned systems across multiple domains. The objective of this project (UxS Autonomy, C2) is to develop requirements and standards, define key interfaces, and mandate compliance to common architecture for Autonomy and Common Control System (CCS) to improve unmanned system capability, reliability and affordability through enabling system modularity, permitting standardized test and evaluation, and enabling cross-platform communication and collaborative mission engagement.

E. Performance Metrics

Publish architecture standards and interface documents, prescribe system developer compliance in RFPs, and successfully demonstrate CCS and autonomy software to the standards through surrogate systems.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	Project (Number/Name) 3393 / *UxS Autonomy, C2,*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
UUV Operation Center	WR	NUWC KPT : Keyport, WA	0.000	0.000		2.000	Dec 2018	2.000	Jan 2020	-		2.000	Continuing	Continuing	Continuing
Future Capability Studies	WR	Various : Various	0.000	0.000		1.635	Dec 2018	0.000		-		0.000	0.000	1.635	-
Common Control System (CCS) Cross-Domain Architecture Development	Various	Various : Various	0.000	0.000		2.895	Dec 2018	1.225	Jan 2020	-		1.225	Continuing	Continuing	Continuing
Autonomy Architutures Development/Lab	Various	Various : Various	0.000	0.000		3.593	Dec 2018	3.342	Dec 2019	-		3.342	Continuing	Continuing	Continuing
Precision Navigation	Various	Various : Various	0.000	0.000		0.000		0.500	Dec 2019	-		0.500	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		10.123		7.067		-		7.067	Continuing	Continuing	N/A

Remarks

FY 2018 and prior funding in Program Element (PE) 0604536N.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Energy Prototype Engineering Support 1	SS/CPFF	Various : Various	0.000	0.000		0.794	Dec 2018	0.000		-		0.000	Continuing	Continuing	Continuing
Autonomy Support	Various	NAVSEA Activities : Washington, DC	0.000	0.000		0.506	Dec 2018	0.280	Dec 2019	-		0.280	Continuing	Continuing	Continuing
Common Control System (CCS) Engineering Support	Various	Various : Various	0.000	0.000		0.480	Dec 2018	0.250	Dec 2019	-		0.250	Continuing	Continuing	Continuing
Precision Navigation	Various	Various : Various	0.000	0.000		0.000		0.664	Jan 2020	-		0.664	0.000	0.664	-
		Subtotal	0.000	0.000		1.780		1.194		-		1.194	Continuing	Continuing	N/A

Remarks

FY 2018 and prior funding in Program Element (PE) 0604536N.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	Project (Number/Name) 3393 / *UxS Autonomy, C2,*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Energy Prototype	Various	Various : Various	0.000	0.000		0.150	Jan 2019	0.000		-		0.000	Continuing	Continuing	Continuing
Autonomy	Various	NAVSEA Activities : Washington, DC	0.000	0.000		0.150	Jan 2019	0.115	Dec 2019	-		0.115	Continuing	Continuing	Continuing
Common Control System (CCS)	Various	Various : Various	0.000	0.000		0.150	Jan 2019	0.115	Feb 2020	-		0.115	Continuing	Continuing	Continuing
Precision Navigation	Various	Various : Various	0.000	0.000		0.000		0.072	Feb 2020	-		0.072	0.000	0.072	-
		Subtotal	0.000	0.000		0.450		0.302		-		0.302	Continuing	Continuing	N/A

Remarks

FY 2018 and prior funding in Program Element (PE) 0604536N.

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		12.353		8.563		-		8.563	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	**Project (Number/Name)** 3393 / *UxS Autonomy, C2,*

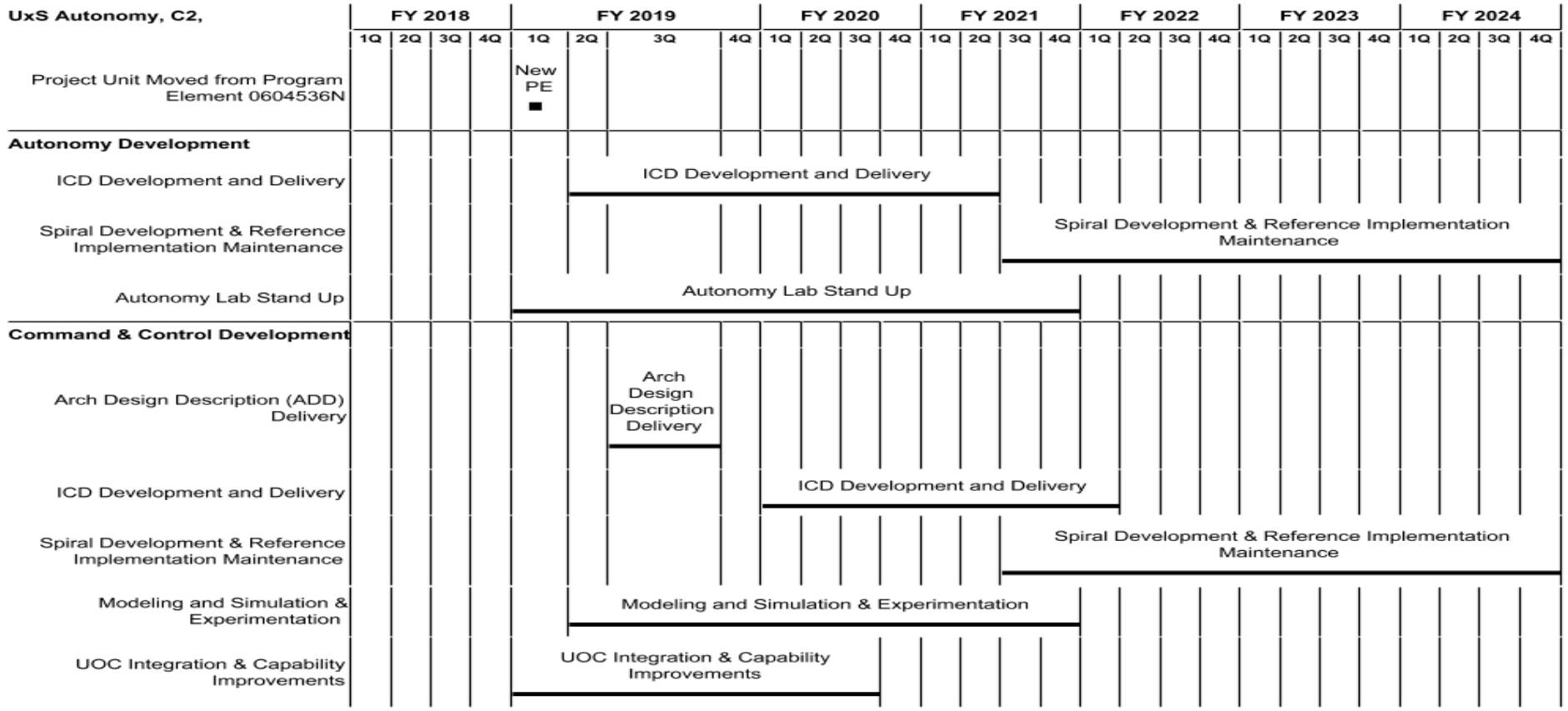

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	**Project (Number/Name)** 3393 / *UxS Autonomy, C2,*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
UxS Autonomy, C2,				
Project Unit Moved from Program Element 0604536N: New PE	1	2019	1	2019
Autonomy Development: ICD Development and Delivery: ICD Development and Delivery	2	2019	2	2021
Autonomy Development: Spiral Development & Reference Implementation Maintenance:	3	2021	4	2024
Autonomy Development: Autonomy Lab Stand Up:	1	2019	4	2021
Command & Control Development: Arch Design Description (ADD) Delivery:	3	2019	3	2019
Command & Control Development: ICD Development and Delivery:	1	2020	1	2022
Command & Control Development: Spiral Development & Reference Implementation Maintenance:	3	2021	4	2024
Command & Control Development: Modeling and Simulation & Experimentation:	2	2019	4	2021
Command & Control Development: UOC Integration & Capability Improvements:	1	2019	3	2020

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	Project (Number/Name) 3395 / *UxS Payloads*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3395: *UxS Payloads*	0.000	0.000	8.080	16.565	-	16.565	10.420	7.280	8.991	9.171	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

FY 2018 and prior funding in Program Element (PE) 0604536N. Projects moved from PE 0604536N starting in FY 2019. Project renamed UxS Payloads starting in FY20 (previously titled Adv Undersea Prototyping-Explosive Payloads in FY19 and prior years).

A. Mission Description and Budget Item Justification

Funding supports advanced prototyping, integration, and demonstration of undersea payloads initially with XLUUV class vehicles, and then eventually with Large, Medium, and Small UUVs in the UUV Family of Systems (FoS). These efforts leverage developments at ONR, DARPA, industry, and other activities for undersea payloads, and work to complete analysis of feasibility, policy, lethality and performance of integrating undersea sensor and weapons systems. The program will design new hardware, investigate and develop new interfaces/systems to increase lethality in both undersea and surface targets and investigate the possibilities of employing non-lethal payloads and other sensor systems across the UUV FoS, as applicable.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Product Development	0.000	6.789	13.749	0.000	13.749
Articles:	-	-	-	-	-
FY 2019 Plans: Continue development of UUV undersea payload systems, including advanced XLUUV payloads. Complete Initial Technical Review for XLUUV payload and order initial material in support of design. Complete initial trade study for non-lethal payloads of the XLUUVs, and re-focus efforts on payloads for Medium UUVs. Continue UUV payload interface development and deliver Interface Control Documents (ICDs). Commence safety and certification analyses. Parallel payload development efforts will enable small to medium UUVs to be submarine launched and recovered.					
FY 2020 Base Plans: Complete Final Technical Review for XLUUV advanced payload. Procure material and fabricate prototypes. Refine CONOPS for demonstrations, finalize ICDs and continue ICD delivery, and continue payload autonomy software development. Initiate integration and test of common payload module. Conduct demonstrations of payload capabilities. Initiate Automated Target Recognition (ATR) maturation efforts. Begin transition of energy and communications payload from ONR. Continue payloads efforts for Medium UUVs.					
FY 2020 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	**Project (Number/Name)** 3395 / *UxS Payloads*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase from FY2019 to FY2020 for integration and testing of payload module and completion of prototype fabrication efforts.					
Title: Support	0.000	0.991	2.153	0.000	2.153
Articles:	-	-	-	-	-
FY 2019 Plans: Support XLUUV payload design efforts. Support Payload Integration Group interface development.					
FY 2020 Base Plans: Support XLUUV payload design and test efforts, and begin logistics support. Payload Integration Group continues to guide and support standard interface development and assists in technology integration. Provide technical support for ATR development.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: Increase from FY 2019 to FY 2020 due to increase in payload effort development.					
Title: Management Services	0.000	0.300	0.663	0.000	0.663
Articles:	-	-	-	-	-
FY 2019 Plans: Provide guidance, project planning, financial and contracting support, and coordination for evaluation and integration of payloads.					
FY 2020 Base Plans: Continue guidance, project planning, financial and contracting support, and coordination for evaluation and integration of payloads.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	**Project (Number/Name)** 3395 / *UxS Payloads*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Slight increase from FY 2019 to FY 2020 due to increase in payload effort development.					
Accomplishments/Planned Programs Subtotals	0.000	8.080	16.565	0.000	16.565

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• RDTEN/0604536N/3395: *Adv Undersea Prototyping-Explosive Payloads*	1.936	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	3.156

Remarks

Funding moved to new Program Element (PE) 0604029N in FY 2019.

D. Acquisition Strategy

UUV Core Technology efforts will accelerate future capabilities and support steady growth of the Navy's Unmanned Undersea Vehicle (UUV) Family of Systems (FoS). UUV Core Technologies will: drive standardization across the UUV FoS; enable Fleet learning and experimentation via Industry involvement and capability demonstrations;
and transition mature technologies from the Science and Technology communities and Industry of which are aligned to Fleet priorities. The program will leverage existing efforts from the Naval Research and Development Enterprise and will utilize rapid contracting approaches such as the Naval Undersea Warfare Center (NUWC) Newport UUV Family of Systems multi-award Indefinite Delivery Indefinite Quantity contract to facilitate Industry involvement. Coordination with UxS platforms will eliminate redundant efforts, encourage innovation, and improve coordination of unmanned systems across multiple domains. The objective of this project (UxS Payloads) is to evaluate, mature, and integrate advanced, innovative payloads onto UUVs to improve warfighting capabilities. Payloads are defined by Navy Fleet capability needs and are developed by leveraging modular designs through collaborative efforts with industry, ONR, DARPA, and the entire Naval Research and Development Enterprise. A Payload Integration Group (IDD) will define Government-owned interfaces to ensure efficient and affordable payload integration across the UUV FoS to support interoperable, innovative solutions. Initial payloads will be integrated and demonstrated on the XLUUV and then be developed for integration into other applicable FoS UUVs after they are demonstrated successfully. communication and collaborative mission engagement.

E. Performance Metrics

Successful demonstrations of multiple undersea payloads. Detailed metrics are classified.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	**Project (Number/Name)** 3395 / *UxS Payloads*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Payload Interface Design & Fabrication	C/CPIF	Various : Various	0.000	0.000		4.400	Jan 2019	4.100	Dec 2019	-		4.100	0.000	8.500	-
Command and Control	WR	Various : Various	0.000	0.000		1.609	Dec 2018	0.000		-		0.000	0.000	1.609	-
Safety	WR	NSWC Indian Head : Indian Head, MD	0.000	0.000		0.780	Jan 2019	0.624	Jan 2020	-		0.624	0.000	1.404	-
Aotomatic Target Recognition	WR	Various : Various	0.000	0.000		0.000		3.000	Jan 2020	-		3.000	Continuing	Continuing	Continuing
Component Development	WR	Various : Various	0.000	0.000		0.000		3.025	Dec 2019	-		3.025	Continuing	Continuing	Continuing
ONR FNC Project	WR	Various : Various	0.000	0.000		0.000		3.000	Dec 2019	-		3.000	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		6.789		13.749		-		13.749	Continuing	Continuing	N/A

Remarks

FY 2018 and prior funding under PE 0604536N. Project renamed UxS Payloads starting in FY20 (previously titled Adv Undersea Prototyping-Explosive Payloads in FY19 and prior years).

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Technical Support	WR	Various : Various	0.000	0.000		0.991	Dec 2019	0.200	Feb 2020	-		0.200	Continuing	Continuing	Continuing
Payload Integration Group	Various	Various : Various	0.000	0.000		0.000		1.000	Dec 2019	-		1.000	Continuing	Continuing	Continuing
Engineering Support	Various	Various : Various	0.000	0.000		0.000		0.600	Nov 2019	-		0.600	Continuing	Continuing	Continuing
Integrated Logistic Support	Various	Various : Various	0.000	0.000		0.000		0.353	Nov 2019	-		0.353	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.991		2.153		-		2.153	Continuing	Continuing	N/A

Remarks

FY 2018 and prior funding under PE 0604536N. Project renamed UxS Payloads starting in FY20 (previously titled Adv Undersea Prototyping-Explosive Payloads in FY19 and prior years).

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	Project (Number/Name) 3395 / *UxS Payloads*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Management & Management Support	WR	Various : Various	0.000	0.000		0.300	Nov 2018	0.663	Dec 2019	-		0.663	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.300		0.663		-		0.663	Continuing	Continuing	N/A

Remarks

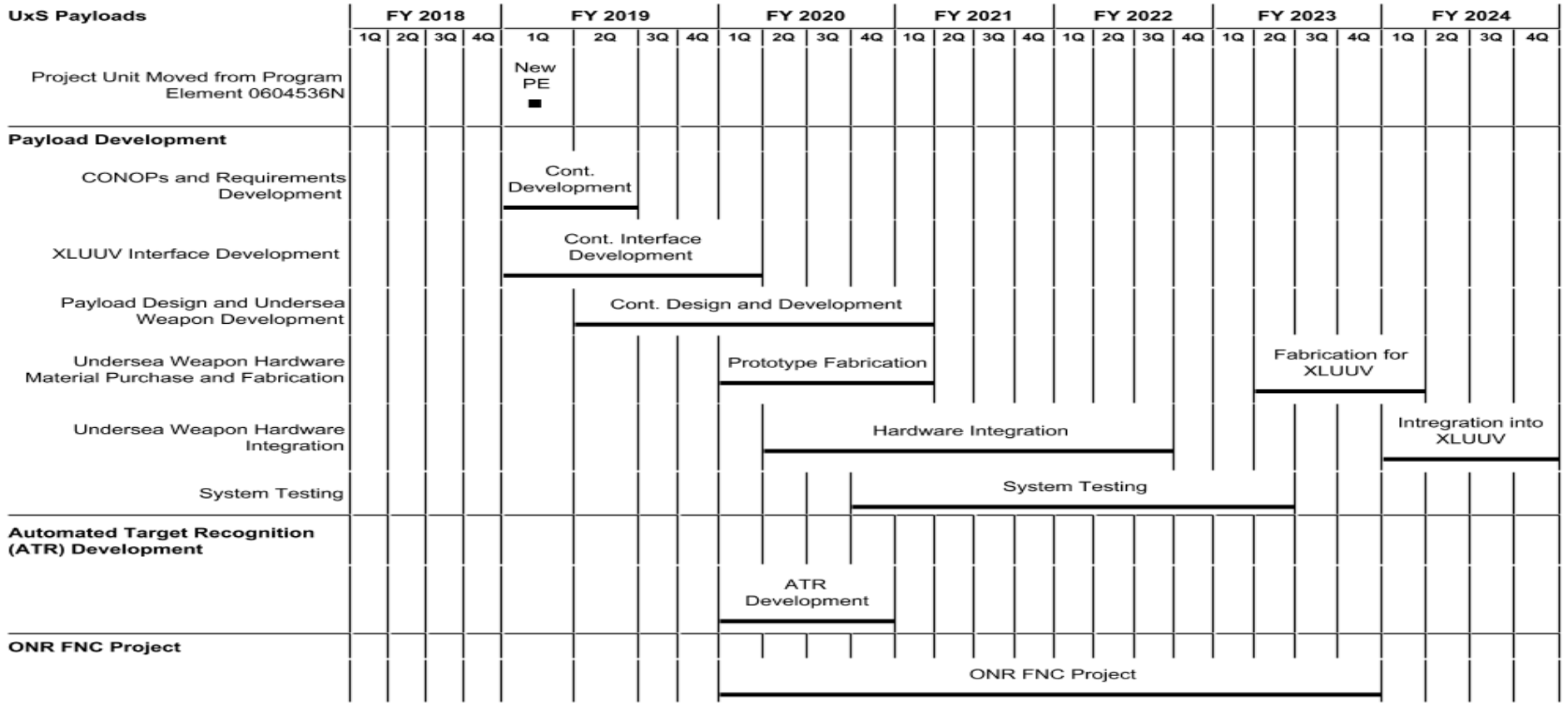
FY 2018 and prior funding under PE 0604536N. Project renamed UxS Payloads starting in FY20 (previously titled Adv Undersea Prototyping-Explosive Payloads in FY19 and prior years).

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		8.080		16.565		-		16.565	Continuing	Continuing	N/A

Remarks

FY 2018 and prior funding under PE 0604536N. Project renamed UxS Payloads starting in FY20 (previously titled Adv Undersea Prototyping-Explosive Payloads in FY19 and prior years).

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	**Project (Number/Name)** 3395 / *UxS Payloads*



2020PB - 0604029N - 3395

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	**Project (Number/Name)** 3395 / *UxS Payloads*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
UxS Payloads				
Project Unit Moved from Program Element 0604536N: New PE	1	2019	1	2019
Payload Development: CONOPs and Requirements Development: CONOPs and Requirements	1	2019	2	2019
Payload Development: XLUUV Interface Development: Schedule Detail	1	2019	1	2020
Payload Development: Payload Design and Undersea Weapon Development: Phase A concept design- XL UUV Interface development	2	2019	1	2021
Payload Development: Undersea Weapon Hardware Material Purchase and Fabrication: Schedule Detail	1	2020	1	2021
Payload Development: Undersea Weapon Hardware Material Purchase and Fabrication:	2	2023	1	2024
Payload Development: Undersea Weapon Hardware Integration: Hardware Integration	2	2020	3	2022
Payload Development: Undersea Weapon Hardware Integration: Integration into XLUUV	1	2024	4	2024
Payload Development: System Testing:	4	2020	2	2023
Automated Target Recognition (ATR) Development: ATR Development	1	2020	4	2020
ONR FNC Project: ONR FNC Project	1	2020	4	2023

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319 / 4					R-1 Program Element (Number/Name) PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*				Project (Number/Name) 3396 / *UxS Endurance*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
3396: *UxS Endurance*	0.000	0.000	7.050	16.782	-	16.782	23.266	21.484	19.651	19.745	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

FY 2018 and prior funding in Program Element (PE) 0604536N. Project moved from PE 0604536N starting in FY 2019. Project 3396 renamed UxS Endurance starting in FY 2020 (previously titled Adv Undersea Prototyping-Non-Lethal Payloads in FY 2019 and prior years).

A. Mission Description and Budget Item Justification

Advanced undersea energy efforts leverages existing independent research and development of energy-dense systems to meet future power requirements for Unmanned Undersea Vehicle (UUV) Family of Systems (FoS) missions, which are limited by both constraints imposed by the operational environment and the amount of power that can be carried. Efforts under this project include research, development, test, and evaluation of advanced energy solutions. Energy development and transition efforts are applicable to all classes of UUVs for increased energy endurance and efficiency to extend the reach of unmanned undersea systems. Parallel efforts include development and certification of high energy density Lithium Ion (Li-Ion) batteries to enable UUV integration onboard submarines.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Product Development	0.000	6.975	13.929	0.000	13.929
Articles:	-	-	-	-	-
FY 2019 Plans: Conduct study of high safety and high reliability battery technologies, including survey of propagation resistant battery architecture and analysis of industry base with focus on cell quality assurance and supply. Investigate Industry fuel cell solutions for UUVs and begin trade studies on other Navy research and development efforts for development and integration on UUVs.					
FY 2020 Base Plans: Execute submarine integration for Li-Ion batteries, including full certification and testing. Commence modeling and simulation and testing of Li-Ion battery and battery management systems to evaluate performance and system safety. Certify and integrate a propagation resistant Li-Ion battery system for use on submarine deployed LDUUV. Continue small and XLUUV sized fuel cell integration and transition efforts as a high density UUV energy solution, including initial hardware and software integration.					
FY 2020 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	**Project (Number/Name)** 3396 / *UxS Endurance*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY 2019 to FY 2020 increase due to increased priority and demand for high energy density UUV power systems (ie fuel cells) and increased Li-Ion certification efforts.					
Title: Support ***Articles:*** ***FY 2019 Plans:*** Prioritize certification of Li-Ion battery for operational use on submarine deployed UUV. Support design and testing efforts. Advise fuel cell design and development. ***FY 2020 Base Plans:*** Continue integration and related certification efforts of Li-Ion battery assets. Continue fuel cell development efforts, demonstrate technology on UUV platform. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase from FY 2019 to FY 2020 due to increase in UxS Endurance efforts.	0.000 -	0.075 -	2.182 -	0.000 -	2.182 -
Title: Management Services ***Articles:*** ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:*** Provide guidance, project planning, financial and contracting support, and coordination for energy system evaluation and integration of payloads. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase from FY 2019 to FY 2020 due to increase in UxS Endurance efforts	0.000 -	0.000 -	0.671 -	0.000 -	0.671 -
Accomplishments/Planned Programs Subtotals	0.000	7.050	16.782	0.000	16.782

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	**Project (Number/Name)** 3396 / *UxS Endurance*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• RDTEN/0604536N/3396: *Adv Undersea Prototyping-Non-Lethal Payloads*	0.978	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1.478

Remarks

Funding moved to new Program Element (PE) 0604029N in FY 2019.

D. Acquisition Strategy

UUV Core Technology efforts will accelerate future capabilities and support steady growth of the Navy's Unmanned Undersea Vehicle (UUV) Family of Systems (FoS). UUV Core Technologies will: drive standardization across the UUV FoS; enable Fleet learning and experimentation via industry involvement and capability demonstrations;
and Transition mature technologies from the Science and Technology communities and Industry of which are aligned to Fleet priorities. The program will leverage existing efforts from the Naval Research and Development Enterprise and will utilize rapid contracting approaches such as the Naval Undersea Warfare Center (NUWC) Newport UUV Family of Systems multi-award Indefinite Delivery Indefinite Quantity contract to facilitate Industry involvement. Coordination with UxS platforms will eliminate redundant efforts, encourage innovation, and improve coordination of unmanned systems across multiple domains. The objective of this project (UxS Endurance) is to mature advanced energy systems developed by industry, NASA, ONR, DARPA, and the Naval Research and Development Enterprise, and integrate into UUVs for increased endurance, power, and reach; and develop safe, reliable battery solutions, including Li-Ion technologies, on UUVs for integration onto host surfaces ships and submarines.

E. Performance Metrics

Demonstrate use of advanced UUV Energy technology in an Advanced Development Model prototype and achieve certifications for Li-ion batteries on host platforms.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	**Project (Number/Name)** 3396 / *UxS Endurance*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Design, Material, & Fabrication Efforts	WR	Various : Various	0.000	0.000		6.975	Nov 2018	0.000	Dec 2019	-		0.000	Continuing	Continuing	Continuing
Li-Ion Battery Certification	WR	NUWC : Newport, RI	0.000	0.000		0.000		5.000	Dec 2019	-		5.000	0.000	5.000	-
LD & XL Energy- Fuel Cell	TBD	Various : Various	0.000	0.000		0.000		3.034	Dec 2019	-		3.034	0.000	3.034	-
Propagation Resistant Li-Ion Battery	TBD	Various : Various	0.000	0.000		0.000		5.895	Dec 2019	-		5.895	0.000	5.895	-
		Subtotal	0.000	0.000		6.975		13.929		-		13.929	Continuing	Continuing	N/A

Remarks

FY 2018 and prior funding under PE 0604536N. Project 3396 renamed UxS Endurance starting in FY 2020 (previously titled Adv Undersea Prototyping-Non-Lethal Payloads in FY19 and prior years).

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Design Analysis	WR	NRL : WASHINGTON, D.C.	0.000	0.000		0.000		1.100	Dec 2019	-		1.100	Continuing	Continuing	Continuing
Program Support	C/FFP	various : Arlington, VA	0.000	0.000		0.075	Nov 2018	1.082	Jan 2020	-		1.082	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.075		2.182		-		2.182	Continuing	Continuing	N/A

Remarks

FY 2018 and prior funding under PE 0604536N. Project 3396 renamed UxS Endurance starting in FY 2020 (previously titled Adv Undersea Prototyping-Non-Lethal Payloads in FY19 and prior years).

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Management Task	Various	Various : Various	0.000	0.000		0.000		0.671	Dec 2019	-		0.671	0.000	0.671	-
		Subtotal	0.000	0.000		0.000		0.671		-		0.671	0.000	0.671	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	Project (Number/Name) 3396 / *UxS Endurance*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract

Remarks

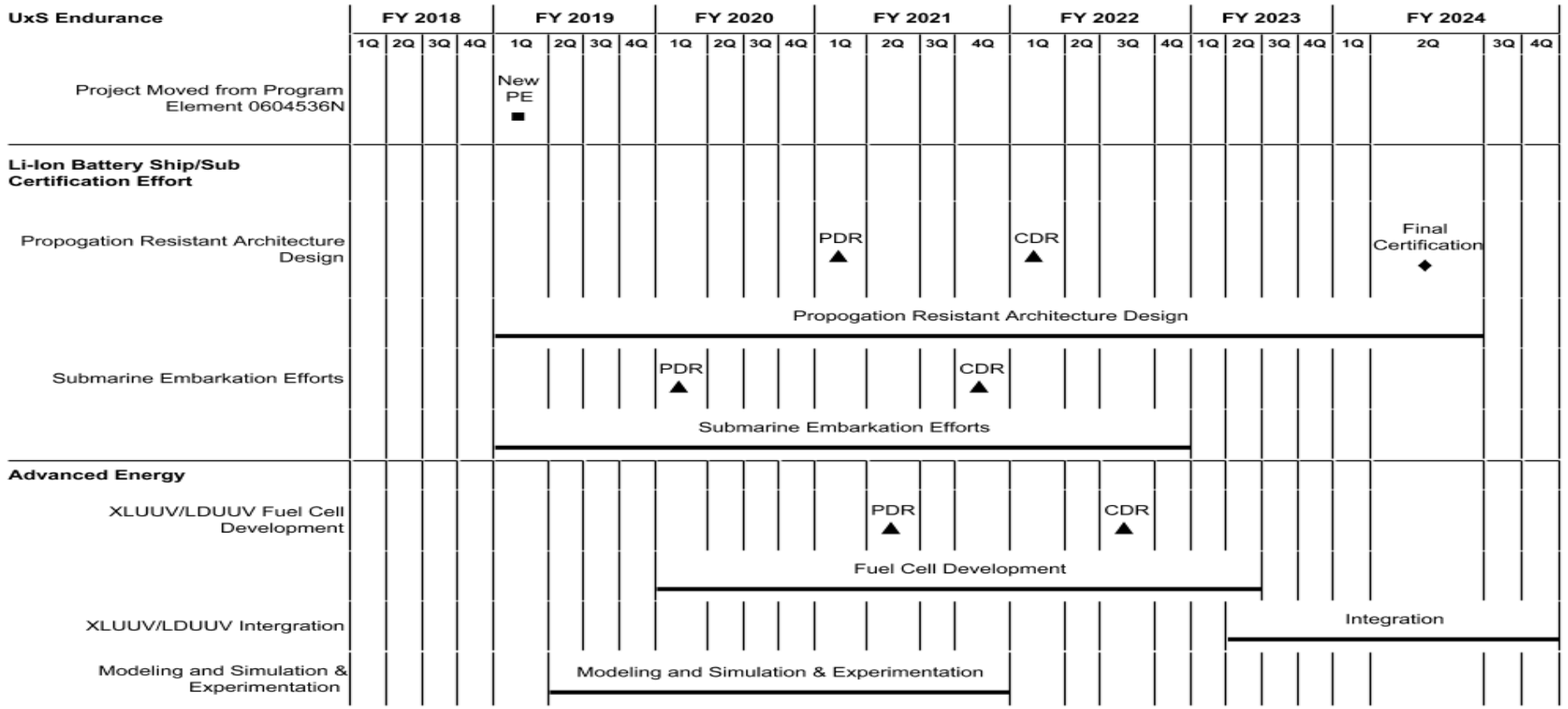
FY 2018 and prior funding under PE 0604536N.

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		7.050		16.782		-		16.782	Continuing	Continuing	N/A

Remarks

FY 2018 and prior funding under PE 0604536N. Project 3396 renamed UxS Endurance starting in FY 2020 (previously titled Adv Undersea Prototyping-Non-Lethal Payloads in FY19 and prior years).

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	**Project (Number/Name)** 3396 / *UxS Endurance*



2020PB - 0604029N - 3396

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	**Project (Number/Name)** 3396 / *UxS Endurance*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
UxS Endurance				
Project Moved from Program Element 0604536N:	1	2019	1	2019
Li-Ion Battery Ship/Sub Certification Effort: Propogation Resistant Architecture Design: Preliminary Design Review	1	2021	1	2021
Li-Ion Battery Ship/Sub Certification Effort: Propogation Resistant Architecture Design: Critical Design Review	1	2022	1	2022
Li-Ion Battery Ship/Sub Certification Effort: Propogation Resistant Architecture Design: Final Certification	2	2024	2	2024
Li-Ion Battery Ship/Sub Certification Effort: Propogation Resistant Architecture Design:	1	2019	2	2024
Li-Ion Battery Ship/Sub Certification Effort: Submarine Embarkation Efforts: Preliminary Design Review	1	2020	1	2020
Li-Ion Battery Ship/Sub Certification Effort: Submarine Embarkation Efforts: Critical Design Review	4	2021	4	2021
Li-Ion Battery Ship/Sub Certification Effort: Submarine Embarkation Efforts:	1	2019	4	2022
Advanced Energy: XLUUV/LDUUV Fuel Cell Development: Preliminary Design Review	2	2021	2	2021
Advanced Energy: XLUUV/LDUUV Fuel Cell Development: Critical Design Review	3	2022	3	2022
Advanced Energy: XLUUV/LDUUV Fuel Cell Development:	1	2020	2	2023
Advanced Energy: XLUUV/LDUUV Intergration:	2	2023	4	2024
Advanced Energy: Modeling and Simulation & Experimentation:	2	2019	4	2021

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	Project (Number/Name) 4053 / *UxS Platform*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
4053: *UxS Platform*	0.000	0.000	0.000	12.466	-	12.466	12.378	9.689	5.309	5.471	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

UxS Platform is a continuation of two FY19 UUV Core Technologies efforts from PE 0604029N and are being transitioned over to PU 4053 beginning in FY20.

A. Mission Description and Budget Item Justification

UxS (Unmanned Systems) Platform is a non-acquisition program that supports rapid innovative research and development prototype efforts to enable integration of deployable and/or retrievable undersea vehicles, payload concepts, and offboard systems through design, manufacture, test/demonstration, evaluation, Rapid Fielding Temporary Alterations (RF TEMPALT) and validation for submarine & other platforms. In addition to research and development, the program will support engineering and integration of new and mature technologies to enable rapid prototyping and fielding of capabilities. This will lower the cost risks of incorporating new technologies prior to acquisition and provide rapid solutions to urgent war-fighter needs. Experimentation will be conducted with the Fleet (i.e., Commander, Naval Submarine Forces (COMSUBFOR), Unmanned Undersea Vehicle Squadron One (UUVRON ONE), etc.), enabling an agile environment through at-sea demonstrations, which will provide Fleet and acquisition stakeholders with relevant payload employment data to inform Concepts of Operations (CONOPs) and fielding decisions. The program will support transition of high-interest systems and/or payloads from research and development to Programs of Record (PoRs), as appropriate. UxS Platform is comprised of Rapid Innovative R&D Prototype Initiatives, RF TEMPALTs, Payload Integration, and Unmanned Undersea Vehicle (UUV) Homeport.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Product Development	0.000	0.000	12.094	0.000	12.094
Articles:	-	-	-	-	-
Description: Rapid Innovative R&D Prototype Initiatives is the development and/or prototyping of rapid technologies efforts that can be incorporated quickly into host platforms/vehicles to enhance Fleet capability. Initiatives will be determined by senior Navy leadership. All initiatives will be demonstrated to provide proof of concept before transitioning to a Program of Record (POR). Rapid Fielding Temporary Alterations (RF TEMPALTs) is the accelerated technical approval process that will support undersea rapid capability demonstrations (non-tactical) and tactical deployment of unmanned systems from host submarine platforms. Payload Integration will develop payload interface standards to include potential hardware for all known small and medium UUVs to enable streamlined development, training and vehicle reconfiguration. The UUV Homeport provides support for multiple UUV efforts, including (but not limited to) infrastructure, engineering, analysis, contracting, test and evaluation (T&E) of prototype support to the Fleet (UUVRON ONE) for capability development. New prototype undersea vehicles and systems will be purchased and/or leased for					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	**Project (Number/Name)** 4053 / *UxS Platform*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
experimentations and demonstrations in warfighting environments. It will enable UUVRON ONE to conduct early assessment of new UUV technology capabilities, generate lessons learned, and provide feedback to the acquisition community. The UUV Homeport will also house the UUV Operations Center (UOC) which is the primary command and control center for Unmanned Systems. ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:*** Continue preliminary study to investigate the use of a NASA approved 18650 Li-Ion battery in a medium sized UUV. Continue a submarine (SSN) launch and recovery effort of small and medium UUVs. Initiate evaluations of vehicle autonomy and validation tools for the Navy's family of UUVs. Establish TEMPALT Coordination Activity (TCA) and databases for the Rapid Fielding TEMPALT process. Develop and implement plans to analyze, test, and certify payloads on small and medium UUVs to inform future transition(s) into PoRs. Develop and test a payload vehicle adapter to be used to merge commercial off the shelf / government off the shelf (COTS/GOTS) vehicle control (e.g., vehicle autonomy, power, communication network, etc.) with the mission payload suite. Conduct experimentation(s) and demonstration(s) of known NAVY UUV capability to inform acquisition decisions. Complete infrastructure study to support XL, Large, Medium, and Small UUV at UUV Homeport. Initiate submarine data exfiltration from UUVs development effort. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase supports establishment of unmanned systems integration.					
Title: Management Services	0.000	0.000	0.372	0.000	0.372
Articles:	-	-	-	-	-
FY 2019 Plans: N/A ***FY 2020 Base Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	**Project (Number/Name)** 4053 / *UxS Platform*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Provide guidance, project planning, financial and contracting support, and coordination for development of prototype efforts for deployable and retrievable UUVs and payload concepts. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase supports establishment of unmanned systems integration.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	12.466	0.000	12.466

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

UUV Core Technology efforts will accelerate future capabilities and support steady growth of the Navy's Unmanned Undersea Vehicle (UUV) Family of Systems (FoS). UUV Core Technologies will: Drive standardization across the UUV FoS; Enable Fleet learning and experimentation via Industry involvement and capability demonstrations; and Transition mature technologies from the Science and Technology communities and Industry of which are aligned to Fleet priorities. By leveraging efforts from the Naval Research and Development Enterprise and Industry for associated technologies and payloads, and integrating them into UUVs at the appropriate level of technical maturity, UUV capabilities for the Fleet will be increasingly enhanced. Coordination with UxS platforms will eliminate redundant efforts, encourage innovation, and improve coordination of unmanned systems across multiple domains. PU 4053: UxS Platform is a non-acquisition program that leverages government laboratories, field activities, and industry to enable research and development efforts in support of technology and system development, manufacture, testing, and fielding on submarine host platforms. Engagement with industry will support development of R&D products for enhanced submarine capability via competitively awarded contracts and sole source Concept Formulation (CONFORM) contracts. These contracting vehicles will facilitate requirements development, prototype development, and prototype production support to allow rapid integration of payloads and offboard systems. Projects and technology capability solutions will transition for inclusion into existing ship baselines or initiation as new POR capabilities.

E. Performance Metrics

Deliver three to five Rapid Fielding TEMPALT projects annually as directed by the Undersea Domain senior leadership. Develop summary report(s) on demonstrations and/or experiments of approaches and predicted performance of new technology and enhanced capabilities.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	**Project (Number/Name)** 4053 / *UxS Platform*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	WR	NUWC NPT : Newport, RI	0.000	0.000		0.000		0.300	Oct 2019	-		0.300	Continuing	Continuing	Continuing
Product Development	WR	NUWC KPT : Keyport, WA	0.000	0.000		0.000		2.959	Oct 2019	-		2.959	Continuing	Continuing	Continuing
Product Development	WR	NSWC CD : West Bethesda, MD	0.000	0.000		0.000		0.150	Oct 2019	-		0.150	Continuing	Continuing	Continuing
Product Development	WR	NRL : Washington DC	0.000	0.000		0.000		0.300	Oct 2019	-		0.300	Continuing	Continuing	Continuing
Product Development	FFRDC	ARL/PSU : Arlington VA	0.000	0.000		0.000		1.150	Oct 2019	-		1.150	Continuing	Continuing	Continuing
Product Development	FFRDC	ARL/UT : Austin, TX	0.000	0.000		0.000		1.800	Oct 2019	-		1.800	Continuing	Continuing	Continuing
Product Development	FFRDC	GTRI : Atlanta, GA	0.000	0.000		0.000		0.183	Oct 2019	-		0.183	Continuing	Continuing	Continuing
Product Development	WR	NSWC DD : Dahlgren, VA	0.000	0.000		0.000		0.052	Oct 2019	-		0.052	Continuing	Continuing	Continuing
Product Development	WR	NASA : Florida	0.000	0.000		0.000		0.500	Oct 2019	-		0.500	Continuing	Continuing	Continuing
Product Development	WR	PSNS : Bremerton, WA	0.000	0.000		0.000		0.200	Oct 2019	-		0.200	Continuing	Continuing	Continuing
Product Development	WR	PNSY : Portsmouth NH	0.000	0.000		0.000		1.000	Oct 2019	-		1.000	Continuing	Continuing	Continuing
Product Development	C/CPAF	Leidos : Reston, VA	0.000	0.000		0.000		3.500	Oct 2019	-		3.500	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		12.094		-		12.094	Continuing	Continuing	N/A

Management Services ($ in Millions)

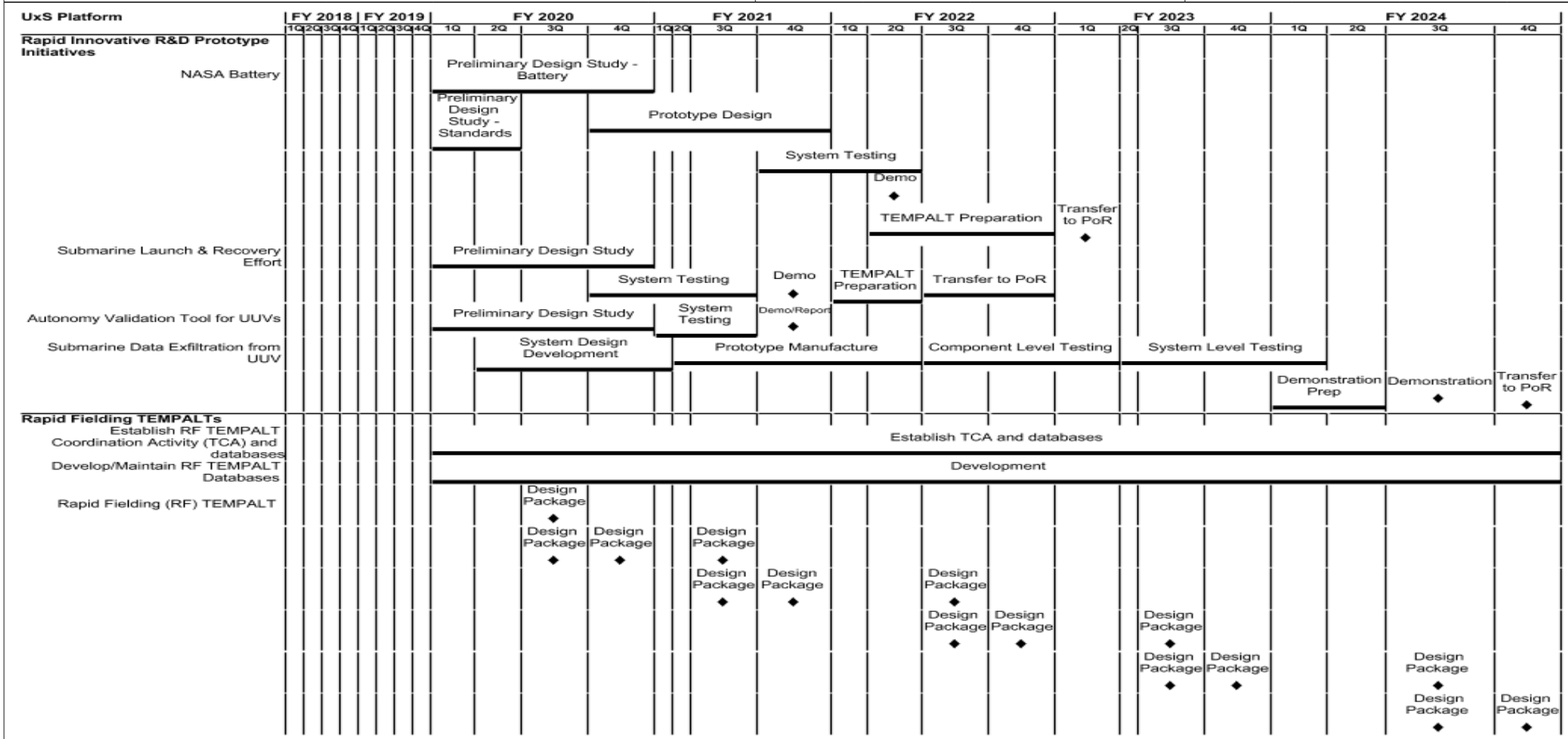
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Management Services	WR	Various : Various	0.000	0.000		0.000		0.372	Oct 2019	-		0.372	0.000	0.372	-
		Subtotal	0.000	0.000		0.000		0.372		-		0.372	0.000	0.372	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	Project (Number/Name) 4053 / *UxS Platform*	

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		0.000		12.466		-		12.466	Continuing	Continuing	N/A

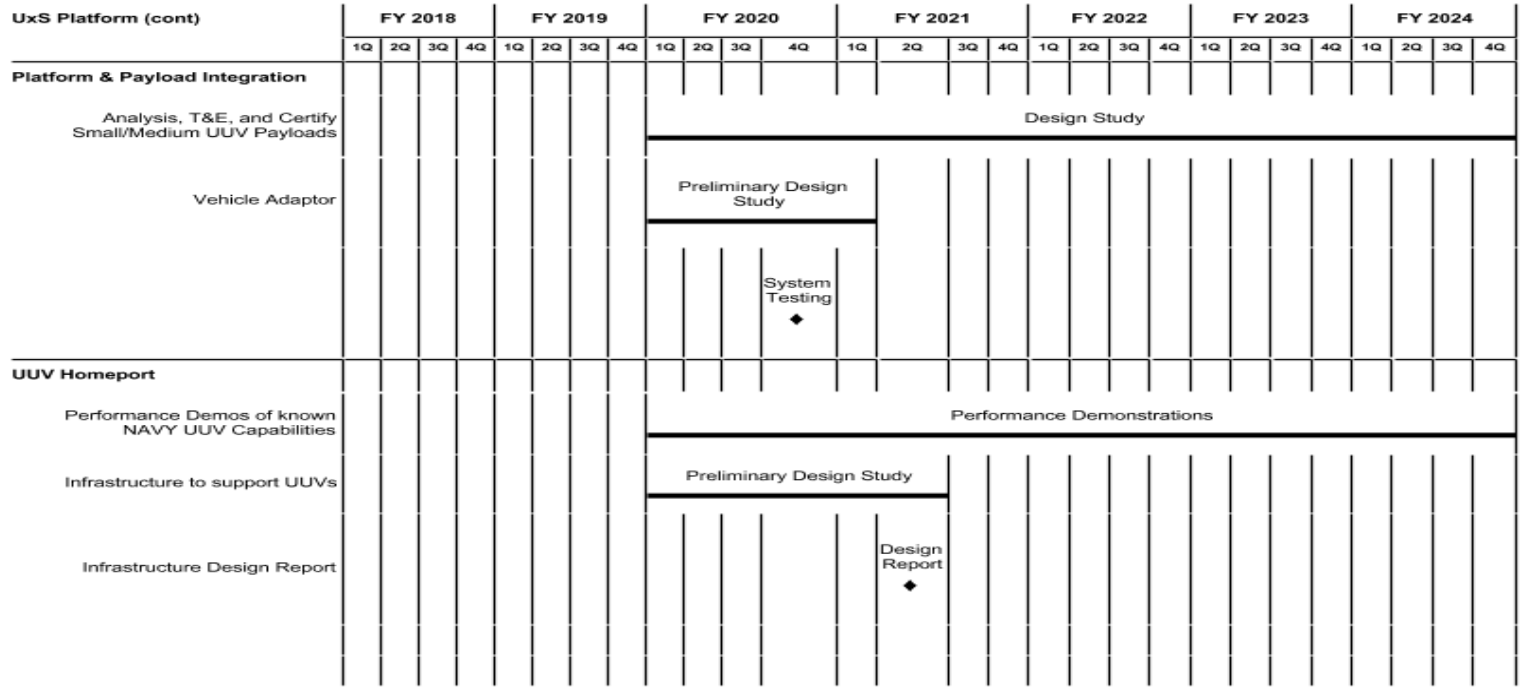
Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	**Project (Number/Name)** 4053 / *UxS Platform*



2020PB - 0604029N - 4053

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	**Project (Number/Name)** 4053 / *UxS Platform*



2020PB - 0604029N - 4053

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	**Project (Number/Name)** 4053 / *UxS Platform*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
UxS Platform				
Rapid Innovative R&D Prototype Initiatives: NASA Battery: Preliminary Design Study - NASA Battery	1	2020	4	2020
Rapid Innovative R&D Prototype Initiatives: NASA Battery: Preliminary Design Study - NASA/NAVY Standards	1	2020	2	2020
Rapid Innovative R&D Prototype Initiatives: NASA Battery: Prototype Design	4	2020	4	2021
Rapid Innovative R&D Prototype Initiatives: NASA Battery: System Testing	4	2021	2	2022
Rapid Innovative R&D Prototype Initiatives: NASA Battery: Performance /Platform Demo	2	2022	2	2022
Rapid Innovative R&D Prototype Initiatives: NASA Battery: TEMPALT Preparation 1	2	2022	4	2022
Rapid Innovative R&D Prototype Initiatives: NASA Battery: TDP Transfer to PoR 1	1	2023	1	2023
Rapid Innovative R&D Prototype Initiatives: Submarine Launch & Recovery Effort: Preliminary Design Study	1	2020	4	2020
Rapid Innovative R&D Prototype Initiatives: Submarine Launch & Recovery Effort: System Testing	4	2020	3	2021
Rapid Innovative R&D Prototype Initiatives: Submarine Launch & Recovery Effort: Performance / Platform Demo	4	2021	4	2021
Rapid Innovative R&D Prototype Initiatives: Submarine Launch & Recovery Effort: TEMPALT Preparation 2	1	2022	2	2022
Rapid Innovative R&D Prototype Initiatives: Submarine Launch & Recovery Effort: TDP Transfer to PoR 2	3	2022	4	2022
Rapid Innovative R&D Prototype Initiatives: Autonomy Validation Tool for UUVs: Preliminary Design Study	1	2020	4	2020
Rapid Innovative R&D Prototype Initiatives: Autonomy Validation Tool for UUVs: System Testing	1	2021	3	2021

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	**Project (Number/Name)** 4053 / *UxS Platform*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Rapid Innovative R&D Prototype Initiatives: Autonomy Validation Tool for UUVs: Performance Demo/Report	4	2021	4	2021
Rapid Innovative R&D Prototype Initiatives: Submarine Data Exfiltration from UUV: System Design Development	2	2020	1	2021
Rapid Innovative R&D Prototype Initiatives: Submarine Data Exfiltration from UUV: Prototype Manufacture	2	2021	2	2022
Rapid Innovative R&D Prototype Initiatives: Submarine Data Exfiltration from UUV: Component Level Testing	3	2022	1	2023
Rapid Innovative R&D Prototype Initiatives: Submarine Data Exfiltration from UUV: System Level Testing	2	2023	1	2024
Rapid Innovative R&D Prototype Initiatives: Submarine Data Exfiltration from UUV: Demonstration Prep	1	2024	2	2024
Rapid Innovative R&D Prototype Initiatives: Submarine Data Exfiltration from UUV: Demonstration	3	2024	3	2024
Rapid Innovative R&D Prototype Initiatives: Submarine Data Exfiltration from UUV: Transfer to PoR	4	2024	4	2024
Rapid Fielding TEMPALTs: Establish RF TEMPALT Coordination Activity (TCA) and databases: Establish TCA and databases	1	2020	4	2024
Rapid Fielding TEMPALTs: Develop/Maintain RF TEMPALT Databases: Develop RF TEMPALT Databases	1	2020	4	2024
Rapid Fielding TEMPALTs: Rapid Fielding (RF) TEMPALT: Design Package 1	3	2020	3	2020
Rapid Fielding TEMPALTs: Rapid Fielding (RF) TEMPALT: Design Package 2	3	2020	3	2020
Rapid Fielding TEMPALTs: Rapid Fielding (RF) TEMPALT: Design Package 3	4	2020	4	2020
Rapid Fielding TEMPALTs: Rapid Fielding (RF) TEMPALT: Design Package 4	3	2021	3	2021
Rapid Fielding TEMPALTs: Rapid Fielding (RF) TEMPALT: Design Package 5	3	2021	3	2021
Rapid Fielding TEMPALTs: Rapid Fielding (RF) TEMPALT: Design Package 6	4	2021	4	2021
Rapid Fielding TEMPALTs: Rapid Fielding (RF) TEMPALT: Design Package 7	3	2022	3	2022
Rapid Fielding TEMPALTs: Rapid Fielding (RF) TEMPALT: Design Package 8	3	2022	3	2022

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604029N / *(U)Unmanned Undersea Vehicle Core Technologies*	**Project (Number/Name)** 4053 / *UxS Platform*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Rapid Fielding TEMPALTs: Rapid Fielding (RF) TEMPALT: Design Package 9	4	2022	4	2022
Rapid Fielding TEMPALTs: Rapid Fielding (RF) TEMPALT: Design Package 10	3	2023	3	2023
Rapid Fielding TEMPALTs: Rapid Fielding (RF) TEMPALT: Design Package 11	3	2023	3	2023
Rapid Fielding TEMPALTs: Rapid Fielding (RF) TEMPALT: Design Package 12	4	2023	4	2023
Rapid Fielding TEMPALTs: Rapid Fielding (RF) TEMPALT: Design Package 13	3	2024	3	2024
Rapid Fielding TEMPALTs: Rapid Fielding (RF) TEMPALT: Design Package 14	3	2024	3	2024
Rapid Fielding TEMPALTs: Rapid Fielding (RF) TEMPALT: Design Package 15	4	2024	4	2024
UxS Platform (cont)				
Platform & Payload Integration: Analysis, T&E, and Certify Small/Medium UUV Payloads: Preliminary Design Study	1	2020	4	2024
Platform & Payload Integration: Vehicle Adaptor: Preliminary Design Study	1	2020	1	2021
Platform & Payload Integration: Vehicle Adaptor: Vehicle Adaptor - System Testing	4	2020	4	2020
UUV Homeport: Performance Demos of known NAVY UUV Capabilities: Performance Demonstrations	1	2020	4	2024
UUV Homeport: Infrastructure to support UUVs: Preliminary Design Study	1	2020	2	2021
UUV Homeport: Infrastructure Design Report: Infrastructure Design Report	2	2021	2	2021