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 0604031N *I (U)Large Unmanned Undersea Vehicles*							
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	23.886	60.304	68.310	-	68.310	81.637	120.436	269.642	129.796	Continuing	Continuing
2094: *Unmanned Underwater Vehicle*	0.000	23.886	60.304	68.310	-	68.310	81.637	120.436	269.642	129.796	Continuing	Continuing

Note

FY 2017 and prior funding in Program Element (PE) 0603502N. Unmanned Underwater Vehicle (UUV) project realigned from PE 0603502N starting in FY 2018.

A. Mission Description and Budget Item Justification

The Snakehead Large Displacement Unmanned Undersea Vehicle (LDUUV) is the Navy's Large Displacement UUV effort as part of the UUV Family of Systems (FoS). It is the number one Submarine-launched UUV priority due to the additional endurance and the capability it will bring to the fleet in support of maintaining the Navy's undersea superiority. In order to accelerate and support steady growth of the fleet's UUV FoS, the Snakehead 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), high energy capacity and power output, highly capable propulsion and maneuvering, and high accuracy 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 program is a CNO/ASN(RDA) approved Accelerated Acquisition.

The Snakehead LDUUV program features a phased approach to grow capabilities at a manageable level of risk. Phase 1 is a Government developed prototype with significant Industry involvement to develop Techniques, Tactics, and Procedures (TTPs), Concepts of Operation (CONOPS), and risk reductions for submarine integration. One Phase 1 vehicle, with sufficient test spares, will be fabricated for integration onto Dry Deck Shelter (DDS) equipped submarines. This is a revision to the previous plan to build two Phase 1 vehicles. Phase 2 will be a competitive award to Industry, with increased capabilities and integration onto Modernized DDS and Payload Handling System (PHS) equipped submarines, as well as potential integration onto surface ships (This is a revision to the previous acquisition strategy of a second Government developed variant followed by an Industry vehicle). In order to support this accelerated transition to Industry, the required Technical Data Package and contracting documents will be compiled in FY19 and FY20, culminating with a competitive Request for Proposal (RFP) release in FY20. An Industry award will occur in FY21, five years earlier than originally planned, for a single vendor design with options to fabricate up to four vehicles starting in FY23.

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 0604031N *I (U)Large Unmanned Undersea Vehicles*		
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	92.613	135.641	-	135.641
Current President's Budget	23.886	60.304	68.310	-	68.310
Total Adjustments	23.886	-32.309	-67.331	-	-67.331
• Congressional General Reductions	-	-0.109			
• Congressional Directed Reductions	-	-32.200			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.714	0.000			
• Program Adjustments	0.000	0.000	-67.331	-	-67.331
• Rate/Misc Adjustments	0.000	0.000	0.000	-	0.000
• Congressional Directed Reductions Adjustments	-35.587	-	-	-	-
• Congressional Add Adjustments	60.187	-	-	-	-

Change Summary Explanation

Program Changes:
FY18 - +$60,187K Congressional realignment establishing new Program Element (PE); -$35,587K LDUUV UUV Program Concurrency; SBIR -$714K
FY19 - -$25,000K Congressional: Transfer to line 94 (XLUUV); -$7,200 Congressional: Accelerate Delta Design; -$109K FFRDC reduction.
FY20 - -$48,435K Orca Dual-vendor Acquisition Strategy; -$18,896K Balance UUV Portfolio

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 0604031N / *(U)Large Unmanned Undersea Vehicles*	Project (Number/Name) 2094 / *Unmanned Underwater Vehicle*	

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
2094: *Unmanned Underwater Vehicle*	0.000	23.886	60.304	68.310	-	68.310	81.637	120.436	269.642	129.796	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

FY 2017 and prior funding in Program Element (PE) 0603502N. Unmanned Underwater Vehicle (UUV) project realigned from PE 0603502N starting in FY 2018.

A. Mission Description and Budget Item Justification

The Snakehead Large Displacement Unmanned Undersea Vehicle (LDUUV) is the Navy's Large Displacement UUV effort as part of the UUV Family of Systems (FoS). It is the number one Submarine-launched UUV priority due to the additional endurance and the capability it will bring to the fleet in support of maintaining the Navy's undersea superiority. In order to accelerate and support steady growth of the fleet's UUV FoS, the Snakehead 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), high energy capacity and power output, highly capable propulsion and maneuvering, and high accuracy 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 program is a CNO/ASN(RDA) approved Accelerated Acquisition phased approach to build capabilities at a manageable level of risk in the Navy's class of Large Displacement Unmanned Undersea Vehicles.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: LDUUV Product Development	18.561	56.726	63.252	0.000	63.252
Articles:	-	-	-	-	-
FY 2019 Plans: Complete detailed design for Phase I LDUUV and complete Critical Design Review (CDR) in 3QFY19. Procure remaining material and parts and commence fabrication of one Phase I LDUUV. Initiate data products development and analysis for submarine integration. Initiate technical data package for platform integration and technical review. Provide engineering services for initial subsystem testing and risk reduction demos. Initiate delta design efforts to incrementally increase UUV capability from undersea platforms and incorporate lessons learned from Phase 1 (submarine certification efforts, risk reduction and battery integration) and prepare Technical Data Package (TDP) for release of RFP to industry in FY20.					
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 0604031N / *(U)Large Unmanned Undersea Vehicles*	**Project (Number/Name)** 2094 / *Unmanned Underwater Vehicle*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Continuation of fabrication of one Phase 1 vehicle and development of data products and analyses. Perform vehicle integration of subsystems, including propulsion, sensors, payload, communications, and control systems. Perform design validation testing concurrent to fabrication. Finalize delta design to incrementally increase UUV capability from undersea platforms and incorporate lessons learned (submarine certification efforts, risk reduction and battery integration) from Phase 1 to prepare TDP for release of RFP to industry in 4QFY20. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase due to full effort on fabrication of Phase I LDUUV and the commencement of delta design efforts to transition to industry vehicles.					
Title: LDUUV Support ***Articles:*** ***FY 2019 Plans:*** Complete final design documentation and drawings, submarine Interface Control Documents, and subsystem test plans to assemble baseline technical data package for platform integration. Support fabrication and material efforts. Support platform integration efforts. Continue supportability analysis. Support Fleet with demonstration exercises with demo vehicles to develop Tactics, Techniques, and Procedures. ***FY 2020 Base Plans:*** Continue support of fabrication and material efforts. Manage submarine and platform integration products. Continue Fleet demonstration exercises with demo vehicles. Prepare for system certification. Provide support of the completion of delta design efforts to prepare TDP for release of RFP. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase due to engineering services to support Phase I LDUUV vehicles and effort associated with Delta design work.	3.653 -	1.731 -	2.644 -	0.000 -	2.644 -
Title: LDUUV Management Services ***Articles:*** ***FY 2019 Plans:***	1.672 -	1.847 -	2.414 -	0.000 -	2.414 -

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 0604031N / *(U)Large Unmanned Undersea Vehicles*	**Project (Number/Name)** 2094 / *Unmanned Underwater Vehicle*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
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 2020 Base Plans:*** Provide program management support and travel for the LDUUV program. Manage concurrent Phase 1 vehicle fabrication and delta design efforts. Program management plans include overall technical guidance and leadership of 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 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increased management support of new acquisition strategy transitioning development to industry.					
Accomplishments/Planned Programs Subtotals	23.886	60.304	68.310	0.000	68.310

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 a risk-reduction UUV followed by competitive award of design and fabrication contracts to Industry. Phase 1 is a Government developed prototype with significant Industry involvement to develop Techniques, Tactics, and Procedures (TTP) and Concepts of Operation (CONOPS) and reduce risk for submarine integration. The Phase 1 strategy was revised from fabrication of two Phase 1 vehicles to one Phase 1 vehicle with sufficient test spares, and with a focus on submarine integration (potential ship integration is deferred to the Industry variant). The Snakehead program revised its Acquisition Strategy to transition to Industry faster. This new strategy still consists of an initial phase of Government-led development with industry engagement and build. However, the Government Phase 2 has been reduced to a delta-design effort to prepare the required Technical Data Package to support a competitive Request for Proposal (RFP) release in FY20. Industry award will take place in FY21, five years earlier than originally planned, for up to two vendors for design with options to fabricate up to four vehicles starting in FY23.

E. Performance Metrics

LDUUV - Complete Critical Design Review (CDR) 3Q FY 2019.

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 0604031N / *(U)Large Unmanned Undersea Vehicles*	**Project (Number/Name)** 2094 / *Unmanned Underwater Vehicle*

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
LDUUV Vehicles, Hardware, & Design	WR	NUWC Newport : Newport, RI	0.000	9.157	Dec 2018	18.411	Dec 2018	20.650	Dec 2019	-		20.650	Continuing	Continuing	Continuing
LDUUV Vehicles, Hardware, & Design	C/CPFF	Various : Various	0.000	0.000		17.589	Dec 2018	18.589	Dec 2019	-		18.589	Continuing	Continuing	Continuing
LDUUV Vehicles, Hardware, & Design	WR	NSWC Carderock : West Bethesda, MD	0.000	2.920	Dec 2018	6.235	Dec 2018	6.535	Dec 2019	-		6.535	Continuing	Continuing	Continuing
LDUUV Vehicles, Hardware,& Design	WR	NSWC Panama City : Panama City, FL	0.000	0.166	Nov 2018	0.000		0.000		-		0.000	0.000	0.166	-
LDUUV Vehicles, Hardware, & Design	SS/CPFF	ARL PSU : State College, PA	0.000	3.410	Feb 2019	8.565	Jan 2019	10.802	Jan 2020	-		10.802	Continuing	Continuing	Continuing
LDUUV Vehicles, Hardware, & Design	WR	SSC Pacific : San Diego, CA	0.000	0.423	Nov 2018	0.306	Dec 2018	0.306	Dec 2019	-		0.306	Continuing	Continuing	Continuing
LDUUV Vehicles, Hardware, & Design	WR	NUWC Keyport : Keyport, WA	0.000	0.856	Dec 2018	5.520	Dec 2018	6.270	Dec 2019	-		6.270	Continuing	Continuing	Continuing
LDUUV Expirimentation and Risk Reduction - Battery Certification	WR	NSWC Crane : Crane, IN	0.000	0.213	Nov 2018	0.100	Dec 2018	0.100	Dec 2019	-		0.100	Continuing	Continuing	Continuing
LDUUV Platform Integration	Various	Various : Various	0.000	0.865	Dec 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
LDUUV Risk Reduction Sonar	SS/CPFF	ARL UT : Austin, TX	0.000	0.551	Dec 2018	0.000		0.000		-		0.000	0.000	0.551	-
		Subtotal	0.000	18.561		56.726		63.252		-		63.252	Continuing	Continuing	N/A

Remarks

FY 2017 and prior funding in Program Element (PE) 0603502N.

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 0604031N / *(U)Large Unmanned Undersea Vehicles*	Project (Number/Name) 2094 / *Unmanned Underwater Vehicle*	

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
LDUUV Engineering Support	WR	NUWC Newport : Newport, RI	0.000	1.693	Dec 2018	0.198	Dec 2018	0.345	Dec 2019	-		0.345	Continuing	Continuing	Continuing
LDUUV Launch and Recovery Engineering Support	WR	NSWC Panama City : Panama City, FL	0.000	0.306	Dec 2018	0.000		0.000		-		0.000	0.000	0.306	-
LDUUV Hydrodynamics and Propulsion Engineering Support	C/CPFF	Various : Various	0.000	0.450	Feb 2019	0.132	Dec 2018	0.132	Dec 2019	-		0.132	Continuing	Continuing	Continuing
LDUUV Hull and Propultion Engineering Support	WR	NSWC Carderock : West Bethsda, MD	0.000	0.286	Nov 2018	0.892	Dec 2018	0.971	Dec 2019	-		0.971	Continuing	Continuing	Continuing
LDUUV Command and Control Engineering Support	WR	SSC Pacific : San Diego, CA	0.000	0.208	Dec 2018	0.361	Dec 2018	0.361	Dec 2019	-		0.361	Continuing	Continuing	Continuing
LDUUV Engineering Support	SS/CPFF	APL/JHU : Laurel, MD	0.000	0.335	Jan 2019	0.100	Jan 2019	0.600	Jan 2020	-		0.600	Continuing	Continuing	Continuing
LDUUV ILS and Engineering Support	WR	NUWC Keyport : Keyport, WA	0.000	0.125	Nov 2018	0.048	Dec 2018	0.235	Dec 2019	-		0.235	Continuing	Continuing	Continuing
LDUUV ILS and Engineering Support	SS/CPFF	Various : Various	0.000	0.250	Nov 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	0.000	3.653		1.731		2.644		-		2.644	Continuing	Continuing	N/A

Remarks

FY 2017 and prior funding in Program Element (PE) 0603502N.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 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
FLEET Experimentation	Various	Various : Various	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
		Subtotal	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604031N / *(U)Large Unmanned Undersea Vehicles*	**Project (Number/Name)** 2094 / *Unmanned Underwater Vehicle*

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
LDUUV Program Management	WR	NUWC Newport : Newport, RI	0.000	0.380	Dec 2018	0.247	Dec 2018	0.579	Dec 2019	-		0.579	Continuing	Continuing	Continuing
LDUUV Program Management	Various	Various : Various	0.000	1.130	Dec 2018	1.500	Dec 2018	1.720	Dec 2019	-		1.720	Continuing	Continuing	Continuing
LDUUV Travel	Various	NAVSEA : Washington, DC	0.000	0.162	Dec 2018	0.100	Dec 2018	0.115	Dec 2019	-		0.115	Continuing	Continuing	Continuing
		Subtotal	0.000	1.672		1.847		2.414		-		2.414	Continuing	Continuing	N/A

Remarks

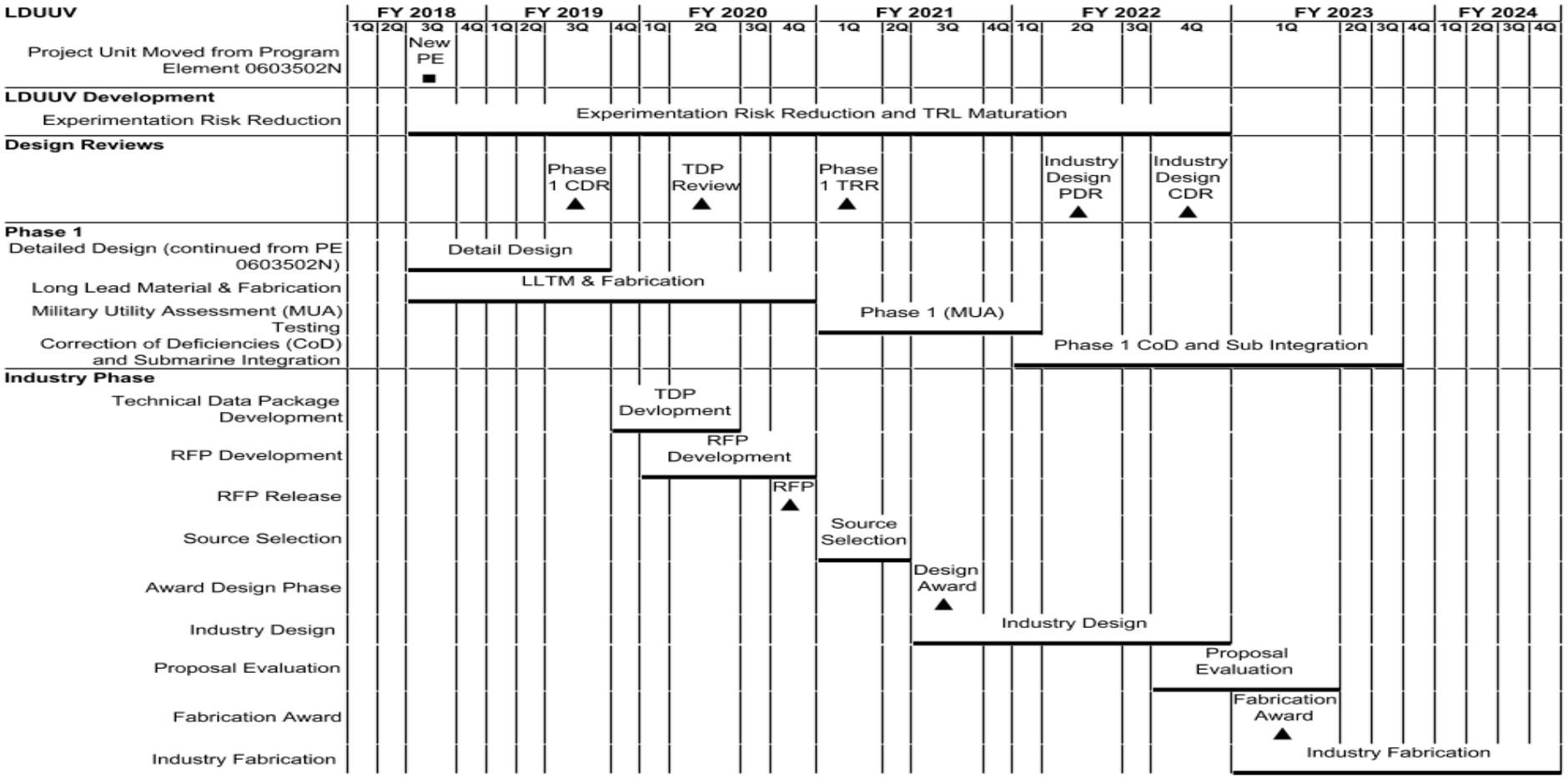
FY 2017 and prior funding in Program Element (PE) 0603502N.

	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	23.886		60.304		68.310		-		68.310	Continuing	Continuing	N/A

Remarks

FY 2017 and prior funding in Program Element (PE) 0603502N.

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 0604031N / *(U)Large Unmanned Undersea Vehicles*	**Project (Number/Name)** 2094 / *Unmanned Underwater Vehicle*



2020PB - 0604031N - 2094

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 0604031N / *(U)Large Unmanned Undersea Vehicles*	**Project (Number/Name)** 2094 / *Unmanned Underwater Vehicle*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
LDUUV				
Project Unit Moved from Program Element 0603502N:	3	2018	3	2018
LDUUV Development: Experimentation Risk Reduction:	3	2018	4	2022
Design Reviews: Phase 1 CDR	3	2019	3	2019
Design Reviews: Phase 1 Test Readiness Review	1	2021	1	2021
Design Reviews: TDP Review	2	2020	2	2020
Design Reviews: Industry Design PDR	2	2022	2	2022
Design Reviews: Industry Design CDR	4	2022	4	2022
Phase 1: Detailed Design (continued from PE 0603502N):	3	2018	3	2019
Phase 1: Long Lead Material & Fabrication:	3	2018	4	2020
Phase 1: Military Utility Assessment (MUA) Testing:	1	2021	1	2022
Phase 1: Correction of Deficiencies (CoD) and Submarine Integration:	1	2022	3	2023
Industry Phase: Technical Data Package Development:	4	2019	2	2020
Industry Phase: RFP Development:	1	2020	4	2020
Industry Phase: RFP Release:	4	2020	4	2020
Industry Phase: Source Selection:	1	2021	2	2021
Industry Phase: Award Design Phase:	3	2021	3	2021
Industry Phase: Industry Design:	3	2021	4	2022
Industry Phase: Proposal Evaluation:	4	2022	1	2023
Industry Phase: Fabrication Award:	1	2023	1	2023
Industry Phase: Industry Fabrication:	1	2023	4	2024