Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Navy											Date: February 2020	
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 Large Unmanned Undersea Vehicles*							
COST ($ in Millions)	**Prior Years**	**FY 2019**	**FY 2020**	**FY 2021 Base**	**FY 2021 OCO**	**FY 2021 Total**	**FY 2022**	**FY 2023**	**FY 2024**	**FY 2025**	**Cost To Complete**	**Total Cost**
Total Program Element	23.886	57.942	68.310	78.122	-	78.122	88.435	186.902	76.365	30.980	Continuing	Continuing
2094: *Unmanned Underwater Vehicle*	23.886	57.942	68.310	78.122	-	78.122	88.435	186.902	76.365	30.980	Continuing	Continuing

Note

The FY 2021 funding request was reduced by $3.973M to account for the availability of prior year execution balances.

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 Family of UUVs. 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 family of UUVs, 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 with testing commencing in FY21. The next phase 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. 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 award to industry 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, including opportunity to leverage Commercial Off-the-Shelf (COTS) vehicles for unique mission capabilities.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Navy					Date: February 2020
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 Large Unmanned Undersea Vehicles*		
B. Program Change Summary ($ in Millions)	**FY 2019**	**FY 2020**	**FY 2021 Base**	**FY 2021 OCO**	**FY 2021 Total**
Previous President's Budget	60.304	68.310	81.637	-	81.637
Current President's Budget	57.942	68.310	78.122	-	78.122
Total Adjustments	-2.362	0.000	-3.515	-	-3.515
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-2.362	0.000			
• Program Adjustments	0.000	0.000	-3.973	-	-3.973
• Rate/Misc Adjustments	0.000	0.000	0.458	-	0.458

Change Summary Explanation

Program Changes:
FY19 - -$2,362K Small Business Innovative Research (SBIR)
FY20 - Not applicable.
FY21 - -$3,973 Underexecution adjustment; +$0.458k miscellaneous adjustments

Technical: Not applicable.
Schedule: Not applicable.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604031N / *Large Unmanned Undersea Vehicles*	Project (Number/Name) 2094 / *Unmanned Underwater Vehicle*	

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
2094: *Unmanned Underwater Vehicle*	23.886	57.942	68.310	78.122	-	78.122	88.435	186.902	76.365	30.980	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

The FY 2021 funding request has been reduced by $3.973 million to account for the availability of prior year execution balances.

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 Family of UUVs. 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 family of UUVs, 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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: LDUUV Product Development	54.364	63.252	68.568	0.000	68.568
Articles:	-	-	-	-	-
FY 2020 Plans: Continue fabrication of 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. Incorporate lessons learned (submarine certification efforts, risk reduction and battery integration) from Phase 1 to prepare Technical Data Package (TDP) for release of RFP to industry in 4QFY20.					
FY 2021 Base Plans: Complete Phase 1 vehicle fabrication and commence system level testing to characterize and assess Phase 1 submarine certification, risk reduction and battery integration. Incorporate hardware and software engineering changes for Phase 1 vehicle during testing. Continue submarine integration certification, risk reduction and					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604031N / *Large Unmanned Undersea Vehicles*	**Project (Number/Name)** 2094 / *Unmanned Underwater Vehicle*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
battery integration efforts. Complete source selection process and award LDUUV industry vehicle design and vehicle fabrication contract(s). ***FY 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Increase in cost as program transitions from development of Phase 1 vehicles to contract for industry vehicle.					
Title: LDUUV Support ***Articles:*** ***FY 2020 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 2021 Base Plans:*** Support of Phase 1 test readiness planning. Continue support of fabrication and test efforts. Continue to manage submarine and platform integration products. Continue Fleet demonstration exercises with demo vehicles. Complete source selection and award contract for industry vehicle. ***FY 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Slight increase for source selection and contract award support.	1.731 -	2.644 -	2.804 -	0.000 -	2.804 -
Title: LDUUV Test and Evaluation ***Articles:*** ***FY 2020 Plans:*** N/A ***FY 2021 Base Plans:*** Prepare for test readiness review (TRR). Conduct preliminary workups, fleet demonstrations, and data analysis to support in-water vehicle Quick Response Assessment (QRA) test event. ***FY 2021 OCO Plans:***	0.000 -	0.000 -	4.092 -	0.000 -	4.092 -

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604031N / *Large Unmanned Undersea Vehicles*	**Project (Number/Name)** 2094 / *Unmanned Underwater Vehicle*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Increase supports Test Readiness Review and initial testing and demonstration of Phase I vehicle.					
Title: LDUUV Management Services	1.847	2.414	2.658	0.000	2.658
Articles:	-	-	-	-	-
FY 2020 Plans: Provide program management support and travel for the LDUUV program. Manage concurrent Phase 1 vehicle fabrication and industry RFP development. 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 2021 Base Plans:*** Provide program management support and travel for the LDUUV program. Manage concurrent Phase 1 vehicle testing and industry contract award. 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 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Slight increase for management of industry contract and Phase 1 test efforts.					
Accomplishments/Planned Programs Subtotals	57.942	68.310	78.122	0.000	78.122

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. Phase 1 will fabricate a single UUV with sufficient test spares to focus on submarine integration (potential ship integration is deferred to the Industry variant). The Navy will develop the required Technical Data Package to support a

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604031N / *Large Unmanned Undersea Vehicles*	**Project (Number/Name)** 2094 / *Unmanned Underwater Vehicle*

competitive Request for Proposal (RFP) release in FY20. A contract award to industry 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. Opportunity to pursue Industry Commercial Off-the-Shelf (COTS) vehicles for unique mission capabilities will be included in the acquisition strategy.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604031N / *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 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
LDUUV Industry Vehicle Design	C/CPIF	TBD : TBD	0.000	0.000		0.000		32.565	Nov 2020	-		32.565	0.000	32.565	-
LDUUV Vehicles, Hardware, & Design	WR	NUWC Newport : Newport, RI	9.157	16.073	Dec 2018	20.650	Dec 2019	12.500	Nov 2020	-		12.500	Continuing	Continuing	Continuing
LDUUV Vehicles, Hardware, & Design	C/CPFF	Various : Various	0.000	17.565	Dec 2018	18.589	Dec 2019	1.900	Oct 2020	-		1.900	Continuing	Continuing	Continuing
LDUUV Vehicles, Hardware, & Design	WR	NSWC Carderock : West Bethesda, MD	2.920	6.235	Dec 2018	6.535	Dec 2019	4.086	Nov 2020	-		4.086	Continuing	Continuing	Continuing
LDUUV Vehicles, Hardware,& Design	WR	NSWC Panama City : Panama City, FL	0.166	0.000		0.000		0.000		-		0.000	0.000	0.166	-
LDUUV Vehicles, Hardware, & Design	SS/CPFF	ARL PSU : State College, PA	3.410	8.565	Jan 2019	10.802	Jan 2020	4.913	Dec 2020	-		4.913	Continuing	Continuing	Continuing
LDUUV Vehicles, Hardware, & Design	WR	SSC Pacific : San Diego, CA	0.423	0.306	Dec 2018	0.306	Dec 2019	0.954	Oct 2020	-		0.954	Continuing	Continuing	Continuing
LDUUV Vehicles, Hardware, & Design	WR	NUWC Keyport : Keyport, WA	0.856	5.520	Dec 2018	6.270	Dec 2019	4.060	Nov 2020	-		4.060	Continuing	Continuing	Continuing
LDUUV Experimentation and Risk Reduction - Battery Certification	WR	NSWC Crane : Crane, IN	0.213	0.100	Dec 2018	0.100	Dec 2019	1.940	Nov 2020	-		1.940	Continuing	Continuing	Continuing
LDUUV Platform Integration	Various	Various : Various	0.865	0.000		0.000		5.650	Feb 2021	-		5.650	Continuing	Continuing	Continuing
LDUUV Risk Reduction Sonar	SS/CPFF	ARL UT : Austin, TX	0.551	0.000		0.000		0.000		-		0.000	0.000	0.551	-
		Subtotal	18.561	54.364		63.252		68.568		-		68.568	Continuing	Continuing	N/A

Remarks

Th FY2021 funding request has been reduced by $3.973 million to account for the availability of prior year funds.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604031N / *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 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
LDUUV Engineering Support	WR	NUWC Newport : Newport, RI	1.693	0.198	Dec 2018	0.345	Dec 2019	0.400	Nov 2020	-		0.400	Continuing	Continuing	Continuing
LDUUV Launch and Recovery Engineering Support	WR	NSWC Panama City : Panama City, FL	0.306	0.000		0.000		0.000		-		0.000	0.000	0.306	-
LDUUV Hydrodynamics and Propulsion Engineering Support	C/CPFF	Various : Various	0.450	0.132	Dec 2018	0.132	Dec 2019	0.132	Nov 2020	-		0.132	Continuing	Continuing	Continuing
LDUUV Hull and Propultion Engineering Support	WR	NSWC Carderock : West Bethsda, MD	0.286	0.892	Dec 2018	0.971	Dec 2019	0.972	Nov 2020	-		0.972	Continuing	Continuing	Continuing
LDUUV Command and Control Engineering Support	WR	SSC Pacific : San Diego, CA	0.208	0.361	Dec 2018	0.361	Dec 2019	0.450	Dec 2020	-		0.450	Continuing	Continuing	Continuing
LDUUV Engineering Support	SS/CPFF	APL/JHU : Laurel, MD	0.335	0.100	Jan 2019	0.600	Jan 2020	0.600	Jan 2021	-		0.600	Continuing	Continuing	Continuing
LDUUV ILS and Engineering Support	WR	NUWC Keyport : Keyport, WA	0.125	0.048	Dec 2018	0.235	Dec 2019	0.250	Nov 2020	-		0.250	Continuing	Continuing	Continuing
LDUUV ILS and Engineering Support	SS/CPFF	Various : Various	0.250	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	3.653	1.731		2.644		2.804		-		2.804	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
FLEET Experimentation	Various	Various : Various	0.000	0.000		0.000		4.092	Dec 2020	-		4.092	0.000	4.092	-
		Subtotal	0.000	0.000		0.000		4.092		-		4.092	0.000	4.092	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604031N / *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 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
LDUUV Program Management	WR	NUWC Newport : Newport, RI	0.380	0.247	Dec 2018	0.579	Dec 2019	0.610	Nov 2020	-		0.610	Continuing	Continuing	Continuing
LDUUV Program Management	Various	Various : Various	1.130	1.500	Dec 2018	1.720	Dec 2019	1.928	Dec 2020	-		1.928	Continuing	Continuing	Continuing
LDUUV Travel	Various	NAVSEA : Washington, DC	0.162	0.100	Dec 2018	0.115	Dec 2019	0.120	Dec 2020	-		0.120	Continuing	Continuing	Continuing
		Subtotal	1.672	1.847		2.414		2.658		-		2.658	Continuing	Continuing	N/A

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	23.886	57.942		68.310		78.122		-		78.122	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604031N / *Large Unmanned Undersea Vehicles*	**Project (Number/Name)** 2094 / *Unmanned Underwater Vehicle*

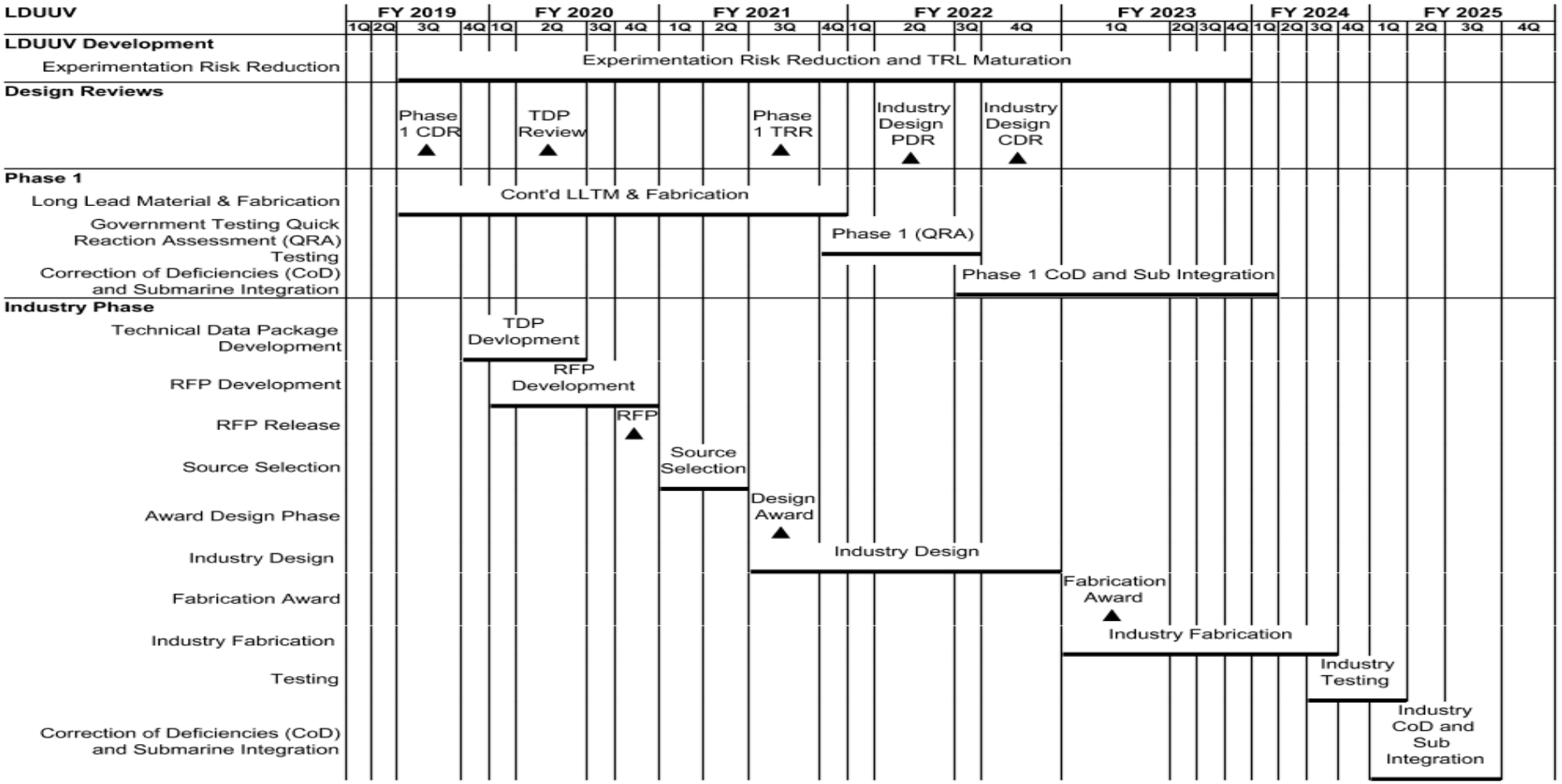

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604031N / *Large Unmanned Undersea Vehicles*	**Project (Number/Name)** 2094 / *Unmanned Underwater Vehicle*

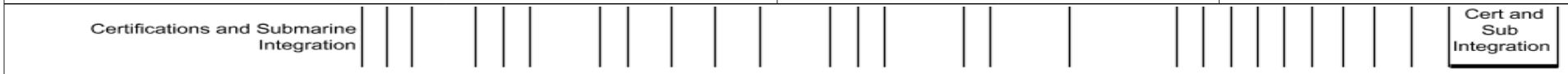

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604031N / *Large Unmanned Undersea Vehicles*	**Project (Number/Name)** 2094 / *Unmanned Underwater Vehicle*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
LDUUV				
LDUUV Development: Experimentation Risk Reduction:	3	2019	4	2023
Design Reviews: Phase 1 CDR	3	2019	3	2019
Design Reviews: Phase 1 Test Readiness Review	3	2021	3	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: Long Lead Material & Fabrication:	3	2019	4	2021
Phase 1: Government Testing Quick Reaction Assessment (QRA) Testing:	4	2021	3	2022
Phase 1: Correction of Deficiencies (CoD) and Submarine Integration:	3	2022	1	2024
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: Fabrication Award:	1	2023	1	2023
Industry Phase: Industry Fabrication:	1	2023	3	2024
Industry Phase: Testing:	3	2024	1	2025
Industry Phase: Correction of Deficiencies (CoD) and Submarine Integration:	1	2025	3	2025
Industry Phase: Certifications and Submarine Integration:	3	2025	4	2025