Exhibit R-2, RDT&E Budget Item Justification: PB 2017 Navy											Date: February 2016	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603561N *I Advanced Submarine System Development*							
COST ($ in Millions)	**Prior Years**	**FY 2015**	**FY 2016**	**FY 2017 Base**	**FY 2017 OCO**	**FY 2017 Total**	**FY 2018**	**FY 2019**	**FY 2020**	**FY 2021**	**Cost To Complete**	**Total Cost**
Total Program Element	858.377	65.913	85.834	100.565	-	100.565	94.556	115.328	109.357	106.469	Continuing	Continuing
0223: *Sub Combat System Improvement (ADV)*	415.027	33.734	38.337	42.296	-	42.296	41.175	51.621	50.902	51.952	Continuing	Continuing
2033: *Adv Submarine Systems Development*	443.350	32.179	37.497	49.877	-	49.877	44.434	43.368	44.285	45.199	Continuing	Continuing
2096: *Payload Delivery Development*	0.000	0.000	0.000	8.392	-	8.392	8.947	20.339	14.170	9.318	Continuing	Continuing
9999: *Congressional Adds*	0.000	0.000	10.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	10.000
Program MDAP/MAIS Code: P444												

A. Mission Description and Budget Item Justification

This program element supports innovative research and development in submarine Hull, Mechanical and Electrical (HM&E) and combat systems technologies and the subsequent evaluation, demonstration, and validation for submarine platforms. It will increase the submarine technology base and provide subsystem design options not currently feasible. The program element also supports programs transitioning from Science and Technology (S&T), Defense Advanced Research Projects Agency (DARPA), Independent Research and Development, and Small Business Innovation Research (SBIR) projects.

Project 0223:
The Submarine Combat System Improvement (Advanced) (Non-ACAT) Project supports Navy Submarine Acoustic Superiority and Technology Insertion Initiatives through the application of advanced development and testing of sensors and sensor processing systems supporting tactical control systems improvements. This Project transitions technologies developed by Navy technology bases, the private sector, Office of Naval Research (ONR), Future Naval Capabilities (FNC), and DARPA. The Project addresses technology challenges to improve tactical control in littoral and open ocean environments for a variety of operational missions including peacetime engagement, surveillance, battle space preparation, deterrence, regional sea denial, precision strike, task group support, and ground warfare support. Prototype hardware/software systems are developed to demonstrate technologically promising system concepts in laboratory and at-sea submarine environments. The focus of hardware systems will be the development and testing of advanced sensor technologies and large array configurations intended to support increased detection ranges and accuracy with increased reliability and lower life cycle costs. This Project is funded under demonstration and validation, as it develops and integrates hardware for experimental tests related to specific platform applications. The focus of software systems will be sensor processing technology efforts conducted under the Advanced Processing Build (APB) program that develops and demonstrates improvements to current and future sensor processing/combat control systems improving detection, localization, classification, decision support, counter-detection vulnerability, and other functions essential to mission success. Technologies and/or capabilities developed under this Project will be shared, as applicable, with surface and surveillance sensor processing/combat system development programs. In particular, development programs for surface ship sonar, Advanced Capability Build (ACB) and surveillance platforms, Advanced Surveillance Build (ASB), will work closely with the APB program to optimize software reuse. Beginning in FY 2015, all three programs (ACB, ASB and APB) are managed under a common development organization and process entitled AxB. While each platform retains its uniqueness and focus in functional domains essential to mission success, a premium is placed on development of

common capabilities and modular architecture technologies to maximize commonality and cost effectiveness. This Project will participate in, and take advantage of, the Tactical Advancements for the Next Generation (TANG) initiative that utilizes Commercial Industrial Design Thinking methodologies to engage the Fleet in generating innovative improvement concepts for Submarine, Surface and Surveillance systems.

Project 2033:
The Advanced Submarine Systems Development (ASSD) Program is a non-acquisition program that develops and matures technologies for successful integration into future and modernized submarine classes, thus lowering acquisition and life cycle program costs while improving mission capability. ASSD transitions Hull, Mechanical, and Electrical (HM&E) technologies and future naval concepts from Science & Technology (S&T) and Research and Development (R&D) to operational platforms; performs tests and demonstrates submarine design and naval architecture products destined for integration into future submarine classes or backfit into existing fleet assets; develops, initially integrates, and does test validation of leading payload concepts for submarine integration in support of the Design for Undersea Warfare; and operates unique R&D experimentation, modeling, testing and simulation facilities to enhance submarine stealth, maneuverability, capability, and affordability. The program also supports Small Business Innovation Research (SBIR), Small Business Technology Transfer (STTR), Office of Naval Research (ONR), Defense Advanced Research Projects Agency (DARPA) programs, and near and mid-term technology insertion to achieve future submarine class total ownership cost reductions, and influence future submarine concept designs and core technologies. Experimentation and demonstration is conducted in a joint warfighting context with other services, (i.e. the U.S. Marines, U.S. Army, and the U.S. Air Force), to enable early assessment of warfighting capabilities, and to contribute to smarter technology selection decisions for potential incremental development. This program also supports Information Exchange Programs and joint Project Agreements (PA) with the United Kingdom, Canada, Australia and other international partners.

Project 2033 is comprised of three budget categories: Stealth, Payloads & Sensors, and Innovative Technology Transition/Concept Development.

The major developmental efforts include:
Sustainment of Vital Submarine Stealth R&D Capabilities
- Large Scale Vehicle (LSV)
- Intermediate Scale Measurement System (ISMS)
- Submarine Signature Management/Acoustic Superiority
- SSN/SSGN Survivability Program (S3P)
- Advanced Hull Coatings

Development of Technologies for Innovative Technology Transition/Concept Development
- Hydraulic Elimination through Electrification
- Advanced CO2 Scrubber (completes in FY16)
- Corrosion Control (Ionic Current Monitoring System (ICMS), Advanced Active Shaft Grounding System (A-ASGS), Sprayable Acoustic Damping System (SADS))
- Advanced Submarine Control (Secondary Propulsion System)
- Advanced Material Propeller (AMP) Technology
- SSN(X)
- Next Generation Propulsor

Exhibit R-2, RDT&E Budget Item Justification: PB 2017 Navy	Date: February 2016
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603561N *I Advanced Submarine System Development*

Improved Payload & Sensor Capabilities
- Next Generation Towed Array Handler System
- Towed Array Reliability
- Payload Integration (Advanced Weapons Enabled by Submarine UAS against Mobile targets (AWESUM), Universal Launch and Recovery Module (ULRM)) and Lithium Ion Battery Certification on an Unmanned Undersea Vehicle
- Integrated Autonomous Undersea Warfare Sensor (IAUWS)
- Speed to Fleet (S2F) (Lithium Ion Battery Certification on an Unmanned Vehicle and EW/ISR UUV
- Fleet Module Autonomous Underwater Vehicle (FMAUV)
- At-sea rapid prototyping and demonstration

Project 2096:
Project established in FY17. Efforts previously funded under 2033. The Universal Launch and Recovery Module (ULRM) supports the launch and recovery of the Large Diameter Unmanned Underwater Vehicle (LDUUV) from an SSGN for a large diameter open ocean interface.

B. Program Change Summary ($ in Millions)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Previous President's Budget	67.551	87.160	91.055	-	91.055
Current President's Budget	65.913	85.834	100.565	-	100.565
Total Adjustments	-1.638	-1.326	9.510	-	9.510
• Congressional General Reductions	-	-0.072			
• Congressional Directed Reductions	-	-11.254			
• Congressional Rescissions	-	-			
• Congressional Adds	-	10.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.638	0.000			
• Program Adjustments	0.000	0.000	10.407	-	10.407
• Rate/Misc Adjustments	0.000	0.000	-0.897	-	-0.897

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2015	FY 2016
Project: 9999: *Congressional Adds*		
Congressional Add: *Adv Sub Sys Dev (Cong)*	0.000	10.000
Congressional Add Subtotals for Project: 9999	0.000	10.000
Congressional Add Totals for all Projects	0.000	10.000

Exhibit R-2, RDT&E Budget Item Justification: PB 2017 Navy	Date: February 2016
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603561N *I Advanced Submarine System Development*

Change Summary Explanation

Decrease in Advanced Submarine Systems Development RDTE,N by $4.186M as required for the Department of the Navy to comply with the Bipartisan Budget Act of 2015.

Project 0223: In FY16, -$3.0M Congressional Reduction for 'Advanced Processing Build (APB) Development Growth'.
FY16 to FY17 increase is due to the ramp-up of the development of Electronic Warfare (EW) improvements within APB efforts. EW develops ship vulnerability assessment tools to counter potential adversaries that are increasingly equipped with modern radars as well as non-Navy maritime traffic congesting littoral waters with high-end electronic signals. EW is a top priority in the CNO's Design for Maintaining Maritime Superiority (Jan-16).

Project 2033: In FY16, -$4.454M Congressional Reduction was applied for Stealth Programs.
In FY16, +$10M Congressional add was applied for Advanced Submarine Control. This add will develop, test and demonstrate numerous high risk advanced submarine control technologies associated with future submarine classes/design with advanced submarine payloads.
FY 2017 Program Adjustments support CNO Speed to Fleet Initiative for ISR/EW UUV and At-sea rapid prototyping, integration, and advanced submarine payloads demonstration. Additionally increase was programmed by CNO for design and procurement of materials for an advanced coatings demonstration as part of the Acoustic Superiority demonstrator (South Dakota Insertion Program - SSN 790).

Project 2096: In FY16, -$3.8M Congressional Reduction was applied for universal launch and recovery module unfunded out year tail.
In FY17, +$8.775M Program Adjustment was applied to fund Universal Launch and Recovery Module (ULRM). Funding was added for Non-Recurring Engineering, Operational Test and Evaluation(OT&E), and production of one Tactical ULRM.

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy			Date: February 2016
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / *Advanced Submarine System Development*	Project (Number/Name) 0223 / *Sub Combat System Improvement (ADV)*	

COST ($ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
0223: *Sub Combat System Improvement (ADV)*	415.027	33.734	38.337	42.296	-	42.296	41.175	51.621	50.902	51.952	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

FY16 to FY17 increase is due to the ramp-up of the development of Electronic Warfare (EW) improvements within APB efforts. EW develops ship vulnerability assessment tools to counter potential adversaries that are increasingly equipped with modern radars as well as non-Navy maritime traffic congesting littoral waters with high-end electronic signals. EW is a top priority in the CNO's Design for Maintaining Maritime Superiority (Jan-16).

The Submarine Combat System Improvement (Advanced) (Non-ACAT) Project supports Navy Submarine Acoustic Superiority and Technology Insertion initiatives by the application of advanced development and testing of sensor processing and tactical control systems improvements. This Project addresses technology challenges to improve tactical control in littoral and open ocean environments for a variety of operational missions including peacetime engagement, surveillance, battle space preparation, deterrence, regional sea denial, precision strike, task group support, and ground warfare support. These technologies, developed by Navy technology bases, the private sector, ONR, FNC, and DARPA are then transitioned. Prototype hardware/software systems are developed to demonstrate technologically promising system concepts in laboratory and at-sea submarine environments. The Advanced Sensor development program develops and tests new sensors and demonstrates large array configurations. Current efforts are directed at Towed Array sensor technologies, telemetry, and architecture, to improve reliability and performance while decreasing program life cycle costs. For large array configurations, Conformal Acoustic Velocity Sonar (CAVES), Wide Aperture Array (WAA), Large Vertical Aperture (LVA) and Large Flank Array (LFA) technologies are also being pursued. Light-Weight Low Cost Conformal Array (LWLCCA) is completing development and transition to fielding. The focus of sensor processing technology efforts through the APB program will address improvements in imaging, tactical control, Electronic Warfare (EW) and acoustics, including detection, localization, classification, ranging, tracking, situational awareness, tactical decision aides, command decision support tools and displays and other functions essential to mission success. Technologies and/or capabilities developed here are shared to optimize re-use and cost effectiveness with surface and surveillance programs under the AxB program management methodology. ACB, ASB and APB may co-develop capabilities and modular architecture technologies to maximize commonality and cost effectiveness. Development efforts may be augmented by innovative concepts generated through the TANG Design Thinking process that includes Fleet operational end-users in capability design.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Title: Advanced Processing Build (APB)	30.534	33.062	36.371	0.000	36.371
Articles:	-	-	-	-	-
FY 2015 Accomplishments: Continued the development of APB-15, integrated APB-15 for testing, and initiated the land-based testing of APB-15, including laboratory string testing. Initiated planning for APB-17 to include the establishment of the					

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 0223 / *Sub Combat System Improvement (ADV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
tactical scenario to guide development focus; conducted a Watch Station Task Analysis (WSTA) gaps and seams test to inform system shortfalls in the context of the selected scenarios; and conducted an Industry Day and Broad Agency Announcement (BAA) solicitation to drive competition for future APB innovative technologies. Completed at-sea testing and the transition of APB-13. ***FY 2016 Plans:*** Use the product of FY15 Return on Investment (ROI), WSTA gaps and seams, and BAA evaluations along with direction from the Fleet/STRG/COMSUBFOR/N97 to establish content and continue the development of capabilities for APB-17. Initiate Electronic Warfare (EW) APB development program on PEO Submarines provided EW system. APB development will include the first two steps of the 4 Step APB process: Step 1 - algorithm assessment by peer review panels of Subject Matter Experts (SME) to down-select technologies and assist developers with technical guidance; Step 2 - algorithm/technology testing with open and closed data sets to further down-select and refine capabilities prior to integration and testing. Complete APB-15 land based testing and ROI and conduct at-sea testing and transition. Conduct a TANG event at the Theater ASW (TASW) level to inform and generate innovative concepts for APB-19. ***FY 2017 Base Plans:*** Continue the development of APB-17, integrate APB-17 for testing, and initiate the land-based testing of APB-17, including laboratory string testing. Continue EW APB development program on PEO Submarines provided EW system*. Initiate planning for APB-19 to include the establishment of the tactical scenario to guide development focus; conduct a WSTA gaps and seams test to inform system shortfalls in the context of the selected scenarios; and conduct an Industry Day and BAA solicitation to drive competition for future APB innovative technologies. Complete at-sea testing and the transition of APB-15. *EW is a top priority in the CNO's Design for Maintaining Maritime Superiority (Jan-16) and the FY16 to FY17 increase is due to the ramp-up of the development of EW improvements within APB. EW develops ship vulnerability assessment tools to counter potential adversaries that are increasingly equipped with modern radars as well as non-Navy maritime traffic congesting littoral waters with high-end electronic signals. ***FY 2017 OCO Plans:*** N/A					
Title: Flank Array Demonstration	0.000	1.675	2.125	0.000	2.125
Articles:	-	-	-	-	-
FY 2015 Accomplishments:					

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 0223 / *Sub Combat System Improvement (ADV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
N/A ***FY 2016 Plans:*** Commence development of beamforming and signal processing improvements to maximize LFA capability as well as tactical/combat system updates making use of improved capabilities to perform target localization. Conduct at-sea testing and data analysis of the LVA-2 array on USS Maryland in support of Acoustic Superiority goals. ***FY 2017 Base Plans:*** Continue development of beamforming and signal processing improvements to maximize LFA capability as well as tactical/combat system updates making use of improved capabilities to perform target localization. Continue data analysis of the at-sea test of LVA-2 array on USS Maryland in support of Acoustic Superiority goals. ***FY 2017 OCO Plans:*** N/A					
Title: Advanced Sensors	3.200	3.600	3.800	0.000	3.800
Articles:	-	-	-	-	-
FY 2015 Accomplishments: Conducted at-sea testing of LWLCCA array with extension of technology to VA class submarines. Completed initial embedded sensor bench-top interface testing with prototype Towed Array (TA) Open Architecture Telemetry (OAT). Conducted environmental testing (pressure & temperature) of prototype embedded TA sensors. Continued development of TA vector sensors. ***FY 2016 Plans:*** Continue TA embedded sensor and open architecture telemetry development. Fabricate embedded sensor test module and conduct tow test to evaluate in-hose performance of embedded senor. Continue development of TA vector sensors. Initiate development of next generation towed array using open architecture and embedded sensor technology ***FY 2017 Base Plans:*** Continue embedded sensor and open architecture telemetry development. Complete open architecture component development and design and fabricate towed array modules to demonstrate high bandwidth operation and dual sample rate capability. ***FY 2017 OCO Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 0223 / *Sub Combat System Improvement (ADV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
N/A					
Accomplishments/Planned Programs Subtotals	33.734	38.337	42.296	0.000	42.296

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Use competitively awarded contracts from Broad BAA solicitations and SBIR initiatives. Integration to fielded systems performed under contracts awarded by the recipient production program within PEO Submarines.

E. Performance Metrics

- APB: Deliver at-sea tested submarine capability improvements to PEO Submarines as prescribed by the Fleet every two years. Conduct milestone reviews with the Milestone Decision Authority (PEO Submarines) prior to delivery.
- Conducted LWLCCA Advanced Development Model (ADM) sea test.
- Deliver Next Generation TB-29(x) embedded sensor prototype evaluation report.
- Deliver Fat Line Vector Sensor Towed Array (VSTA) Lake Pend Oreille test reports.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2017 Navy			Date: February 2016
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / *Advanced Submarine System Development*	Project (Number/Name) 0223 / *Sub Combat System Improvement (ADV)*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	C/CPFF	Adaptive Methods : VA	0.925	0.250	Feb 2015	0.000		0.000		-		0.000	0.000	1.175	Continuing
Product Development	C/CPFF	Alion Sciences : VA	3.267	0.000		0.000		0.000		-		0.000	0.000	3.267	Continuing
Product Development	C/CPFF	Arete : CA	0.150	0.400	Jan 2015	0.400	Feb 2016	0.400	Dec 2016	-		0.400	Continuing	Continuing	Continuing
Product Development	C/CPFF	Chesapeake Science (L-3) : MD	7.551	0.000		0.000		0.000		-		0.000	0.000	7.551	Continuing
Product Development	C/CPFF	Electric Boat : ME	1.765	0.000		0.050	Mar 2016	0.000		-		0.000	0.000	1.815	Continuing
Product Development	C/CPFF	General Dynamics : VA	18.097	2.000	Dec 2014	1.934	Dec 2015	2.500	Dec 2016	-		2.500	Continuing	Continuing	Continuing
Product Development	C/CPFF	GA Tech Research Institute : GA	2.966	0.050	Dec 2014	0.075	Feb 2016	0.050	Dec 2016	-		0.050	Continuing	Continuing	Continuing
Product Development	C/CPFF	In Depth Engineering : VA	4.500	0.200	Dec 2014	0.500	Dec 2015	0.500	Dec 2016	-		0.500	Continuing	Continuing	Continuing
Product Development	C/CPFF	JHU/APL : MD	78.833	7.322	Dec 2014	7.100	Nov 2015	7.600	Dec 2016	-		7.600	Continuing	Continuing	Continuing
Product Development	C/CPFF	Lockheed Martin : VA	47.777	7.581	Dec 2014	6.970	Jan 2016	8.935	Dec 2016	-		8.935	Continuing	Continuing	Continuing
Product Development	C/CPFF	Lockheed Martin : NY	9.564	0.000		0.000		0.000		-		0.000	0.000	9.564	Continuing
Product Development	C/CPFF	Metron : VA	4.658	0.715	Dec 2014	1.000	Dec 2015	1.000	Dec 2016	-		1.000	Continuing	Continuing	Continuing
Product Development	WR	NSWC/Carderock : MD	25.200	0.685	Nov 2014	1.064	Nov 2015	1.800	Nov 2016	-		1.800	Continuing	Continuing	Continuing
Product Development	WR	NUWC/Newport : RI	81.044	5.304	Nov 2014	6.475	Nov 2015	6.472	Nov 2016	-		6.472	Continuing	Continuing	Continuing
Product Development	C/CPAF	NSMA : VA	10.494	0.650	Jan 2015	0.650	Mar 2016	0.650	Dec 2016	-		0.650	Continuing	Continuing	Continuing
Product Development	WR	ONI : DC	2.295	0.000		0.000		0.000		-		0.000	0.000	2.295	Continuing
Product Development	WR	ONR : VA	2.725	0.000		0.000		0.000		-		0.000	0.000	2.725	Continuing
Product Development	C/CPFF	Progeny : VA	6.768	0.451	Dec 2014	1.295	Dec 2015	1.295	Dec 2016	-		1.295	Continuing	Continuing	Continuing
Product Development	C/CPFF	PSU/ARL : PA	8.480	0.600	Dec 2014	0.600	Dec 2015	1.200	Dec 2016	-		1.200	Continuing	Continuing	Continuing
Product Development	C/CPFF	SAIC : VA	3.555	0.000		0.000		0.000		-		0.000	0.000	3.555	Continuing
Product Development	C/CPFF	Sedna Digital : VA	9.364	1.400	Dec 2014	1.750	Nov 2015	2.050	Dec 2016	-		2.050	Continuing	Continuing	Continuing
Product Development	WR	SSC/San Diego : CA	1.813	0.150	Dec 2014	0.000		0.000		-		0.000	0.000	1.963	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2017 Navy			Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 0223 / *Sub Combat System Improvement (ADV)*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	MIPR	U.S. Army Research Lab : MD	1.700	0.000		0.000		0.000		-		0.000	0.000	1.700	Continuing
Product Development	MIPR	U.S. Army/MITRE : NJ	4.595	0.000		0.000		0.000		-		0.000	0.000	4.595	Continuing
Product Development	MIPR	U.S. Hanscom AFB/ MIT Lincoln Labs : MA	14.184	1.225	Jan 2015	1.680	Nov 2015	2.150	Dec 2016	-		2.150	Continuing	Continuing	Continuing
Product Development	C/CPFF	UT/ARL : TX	26.326	1.546	Feb 2015	1.125	Dec 2015	1.000	Dec 2016	-		1.000	Continuing	Continuing	Continuing
Product Development	C/CPFF	VAR : VAR*	19.866	2.135	Dec 2014	4.611	Dec 2015	3.636	Dec 2016	-		3.636	Continuing	Continuing	Continuing
		Subtotal	398.462	32.664		37.279		41.238		-		41.238	-	-	-

Remarks

*Consists of multiple performing activities with funding for each not greater than $1M per year.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	C/CPAF	BAE Systems : MD	11.915	0.750	Nov 2014	0.000		0.000		-		0.000	0.000	12.665	Continuing
Program Management Support	C/CPIF	CGI Federal : VA	0.000	0.000		1.000	Dec 2015	1.000	Dec 2016	-		1.000	Continuing	Continuing	Continuing
Program Management Support	C/CPFF	EG&G (URS) : VA	4.030	0.261	Dec 2014	0.000		0.000		-		0.000	0.000	4.291	Continuing
Travel	Allot	NAVSEA PEO IWS5 : DC	0.620	0.059	Nov 2014	0.058	Oct 2015	0.058	Oct 2016	-		0.058	Continuing	Continuing	Continuing
		Subtotal	16.565	1.070		1.058		1.058		-		1.058	-	-	-

	Prior Years	FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	415.027	33.734		38.337		42.296		-		42.296	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2017 Navy			Date: February 2016
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / *Advanced Submarine System Development*	Project (Number/Name) 0223 / *Sub Combat System Improvement (ADV)*	

	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 0223 / *Sub Combat System Improvement (ADV)*

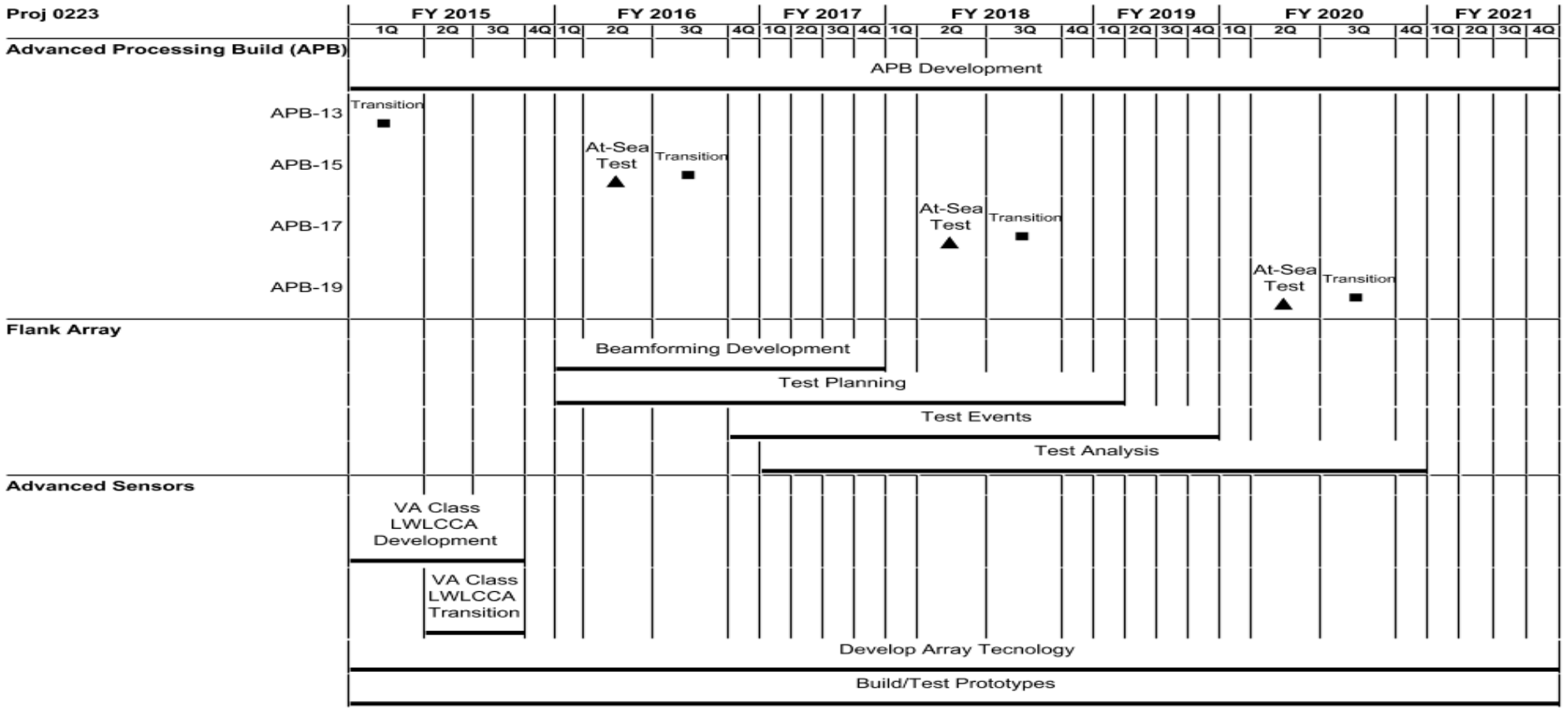

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Exhibit R-4A, RDT&E Schedule Details: PB 2017 Navy		Date: February 2016
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Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 0223				
Advanced Processing Build (APB): APB Development (continued)	1	2015	4	2021
Advanced Processing Build (APB): APB-13: Transition APB-13 to PEO Submarines Production Programs	1	2015	1	2015
Advanced Processing Build (APB): APB-15: APB-15 At-Sea Test	2	2016	2	2016
Advanced Processing Build (APB): APB-15: Transition APB-15 to PEO Submarines Production Programs	3	2016	3	2016
Advanced Processing Build (APB): APB-17: APB-17 At-Sea Test	2	2018	2	2018
Advanced Processing Build (APB): APB-17: Transition APB-17 to PEO Submarines Production Programs	3	2018	3	2018
Advanced Processing Build (APB): APB-19: APB-19 At-Sea Test	2	2020	2	2020
Advanced Processing Build (APB): APB-19: Transition APB-19 to PEO Submarines Production Programs	3	2020	3	2020
Flank Array: Beamforming Development	1	2016	4	2017
Flank Array: Flank Array Test Planning	1	2016	1	2019
Flank Array: Flank Array Test Conduct	4	2016	4	2019
Flank Array: Flank Array Test Analysis	1	2017	4	2020
Advanced Sensors: VA Class LWLCCA Development Extension	1	2015	3	2015
Advanced Sensors: Transition LWLCCA to VA Class	2	2015	3	2015
Advanced Sensors: Develop Array Technologies (continued)	1	2015	4	2021
Advanced Sensors: Build & Test Prototype Arrays (continued)	1	2015	4	2021

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COST ($ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
2033: *Adv Submarine Systems Development*	443.350	32.179	37.497	49.877	-	49.877	44.434	43.368	44.285	45.199	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The increase in funding from FY 2016 to FY 2017 is to support CNO Speed to Fleet Initiative for ISR/EW UUV and At-sea rapid prototyping, integration, and advanced submarine payloads demonstration. Additionally increase was programmed by CNO for design and procurement of materials for an advanced coatings demonstration as part of the Acoustic Superiority demonstrator (South Dakota Insertion Program - SSN 790).

The Advanced Submarine Systems Development (ASSD) Program is a non-acquisition program that develops and matures technologies for successful integration into future and modernized submarine classes, thus lowering acquisition and life cycle program costs while improving mission capability. ASSD transitions Hull, Mechanical, and Electrical (HM&E) technologies and future naval concepts from Science & Technology (S&T) and Research and Development (R&D) to operational platforms; performs tests and demonstrates submarine design and naval architecture products destined for integration into future submarine classes or backfit into existing fleet assets; develops, initially integrates, and does test validation of leading payload concepts for submarine integration in support of the Design for Undersea Warfare; and operates unique R&D experimentation, modeling, testing and simulation facilities to enhance submarine stealth, maneuverability, capability, and affordability. The program also supports Small Business Innovation Research (SBIR), Small Business Technology Transfer (STTR), Office of Secretary of Defense (OSD), Office of Naval Research (ONR), and Defense Advanced Research Projects Agency (DARPA), programs and near and mid-term technology insertion to achieve future submarine class total ownership cost reductions, and influence future submarine concept designs and core technologies. Experimentation and demonstration is conducted in a joint warfighting context with other services, (i.e. the U.S. Marines, U.S. Army, and the U.S. Air Force), to enable early assessment of warfighting capabilities, and to contribute to smarter technology selection decisions for potential incremental development. This program also supports Information Exchange Programs and joint Project Agreements (PA) with the United Kingdom, Canada, Australia and other international partners.

Project 2033 is comprised of three budget categories: Stealth, Payloads & Sensors, and Innovative Technology Transition/Concept Development.

The major developmental efforts include:
Sustainment of Vital Submarine Stealth R&D Capabilities
- Large Scale Vehicle (LSV)
- Intermediate Scale Measurement System (ISMS)
- Submarine Signature Management/Acoustic Superiority
- SSN/SSGN Survivability Program (S3P)
- Advanced Hull Coatings

Development of Technologies for Innovative Technology Transition/Concept Development
- Hydraulic Elimination through Electrification

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- Advanced CO2 Scrubber (completes in FY16)
- Corrosion Control (Ionic Current Monitoring System (ICMS), Advanced Active Shaft Grounding System A-ASGS)
- Sprayable Acoustic Damping System (SADS))
- Advanced Submarine Control (Secondary Propulsion System)
- Advanced Material Propeller (AMP) Technology
- Next Generation Propulsor
- SSN(X)

Improved Payload & Sensor Capabilities
- Next Generation Towed Array Handler System
- Towed Array Reliability
- Payload Integration (Advanced Weapons Enabled by Submarine UAS against Mobile targets (AWESUM), Submarine Launched Decoy (SLD)
- Integrated Autonomous Undersea Warfare Surveillance (IAUWS)
- Speed to Fleet (S2F)(Lithium Ion Battery Certification on an Unmanned Undersea Vehicle and EW/ISR UUV
- Fleet Module Autonomous Underwater Vehicle (FMUAV)

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Title: Stealth/Subtotal Cost	16.035	25.892	35.210	0.000	35.210
Articles:	-	-	-	-	-
Description: Develop technologies and tools to increase the survivability of submarines by recognizing and mitigating sources of acoustic and non-acoustic vulnerabilities to ensure submarines can penetrate contested waters and remain undetected in the littorals. Develop technologies and Tactics, Techniques, and Procedures (TTPs) that facilitate new or enhance existing warfighting concepts. Sustain Navy R&D capability for continued operations of the Large Scale Vehicle (LSV 2) and the Intermediate Scale Measurement System (ISMS) test facility in support of VIRGINIA and OHIO Replacement Class Programs of Record (plus numerous other smaller programs) to conduct large scale model experiments for submarines focusing on stealth, maneuvering and control, affordability, and operational effectiveness. Stealth hosts the SSN/SSGN Survivability Program (S3P) which addresses gaps in stealth and the survivability for current and future SSN/SSGN force. S3P investigates, prioritizes, and validates survivability issues and then proposes and directs the development and validation of suitable countermeasures. S3P conducts operational and technical assessments in support of the current operations and submarine acquisition programs and will execute testing and analysis to address vulnerabilities associated with masts and communications, periscope depth operations, and acoustic sensors. Advanced coatings will develop methods to model and test existing US and UK coating materials as well as develop new coating materials for improved acoustic performance. New coatings' systems with high Technology Readiness Level (TRL) will be identified for near term implementation on VIRGINIA class platform will be supported.					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
FY 2015 Accomplishments: Continued Electromagnetic Silencing Project Agreement (PA) with the UK executing the follow-on efforts for scale stress magnetization and electric model experiments. Developed program plan associated with proposed new Electromagnetic Silencing PA with the UK including further scale stress magnetization and electric model experiments as well as large/full-scale experiments. Completed technology and sensors refresh at ISMS range. Conducted LSV core systems maintenance, maintain crew qualification, maintain support systems, and operate and maintain LSV and ISMS acoustic test ranges. Continued supporting ship and system alterations to safely support OHIO Replacement signature and propulsor trials. Prepared for and conduct LSV program Independent Assessment. Conducted critical OHIO Replacement propulsor trials. Implement plan for long-term recapitalization of LSV2, including near-term electric drive system replacement design. Conduct advanced coating laboratory performance tests for US and UK materials. Defined requirements and initiate Treatment Configuration. S3P addressed four, high-priority fleet questions in stealth and survivability for current missions and addressed three technical questions regarding operational and acquisition stealth requirements for future SSN/SSGN force tactical and strategic operations. S3P accomplishments included research installation of a developmental vulnerability countermeasure (PELAGOS), final laboratory testing of a non-acoustic vulnerability countermeasure (ATOMS), field laboratory testing of submarine masts, and acoustic superiority analysis (specific details are classified). S3P completed one sea test, seven limited scope at-sea measurements, and one virtual exercise.					
FY 2016 Plans: Continue Electromagnetic Silencing PA with the UK executing the follow-on efforts for scale stress magnetization and electric model experiments. Conduct system upgrades on ISMS. Conduct LSV2 core ship systems maintenance, maintain crew qualification, ensure compliance with all LSVSAFE and general regulations, maintain and operate acoustic data systems and all required shore support systems. Conduct Independent Assessment and implement findings, operate and maintain ISMS acoustic test range underwater and shore-based facilities. Continue critical OHIO Replacement propulsor trials and conduct prop testing. Support ship and system alterations to safely support OHIO Replacement signature and propulsor trials, including replacement of LSV acoustic array and underwater tracking systems. Complete plan for long-term recapitalization of LSV2, including near-term electric drive system replacement design. Conduct advanced coating laboratory performance tests for US and UK materials. Commence risk reduction efforts associated demonstration of high TRL coating system on VA class platform. Commence the finalization of requirements and treatment configuration, procure materials and test. Define requirements and finalize program to transition ONR Future Naval Capability (FNC) coating concepts to future undersea platforms. S3P will address fleet questions in					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
stealth and survivability for current missions as established by the Submarine Operations Group and Operations Review Group. S3P will also respond to technical questions related to operational and acquisition stealth requirements for future SSN/SSGN force. S3P accomplishments will include completion of an Operational Survivability Assessment, tactical installation and mission deployment and validation testing of development vulnerability countermeasure (PELAGOS), at-sea testing to characterizing VA Class mast vulnerabilities, analysis and testing of communication vulnerabilities, and acoustic superiority analysis and testing (details classified). Conduct three sea tests, two limited scope at-sea measurements, and two virtual exercises are planned. Additionally, four test windows are planned during the six-month operational deployment of PELAGOS. ***FY 2017 Base Plans:*** Perform laboratory stress magnetization and electric model experiments on joint US/UK models. Commence detailed planning associated with large-scale testing to perform underwater electric and magnetic signature testing utilizing UK asset(s) at US range facility. Complete system upgrades on ISMS. Conduct LSV2 core ship systems maintenance, maintain crew qualification, ensure compliance with all LSVSAFE and general regulations, maintain and operate acoustic data systems and all required shore support systems. Conduct Independent Assessment and implement findings, operate and maintain ISMS acoustic test range underwater and shore-based facilities. Continue critical OHIO Replacement propulsor trials. Support ship and system alterations to safely support OHIO Replacement signature and propulsor trials, including replacement of LSV acoustic array and underwater tracking systems. Conduct advanced coating laboratory performance tests for US and UK materials. Finalize requirements and treatment configuration, procure materials and test. Commence fabrication treatment and development of Operational Alteration (OPALT) package. Leverage lessons learned from VA class advanced hull treatment demonstration to initiate qualification testing associated with transition of ONR FNC treatment concepts for future platforms, Identify full-scale demonstration opportunities and initiate development of required Alteration data packages. S3P plans to address gaps in stealth and survivability for current and future SSN/SSGN force to include responding to fleet questions on current tactical vulnerabilities, completion of an annual Operational Survivability Assessment, final assessment of VA Block V acoustic superiority requirements, analysis of deployment data from vulnerability countermeasure (PELAGOS), determination of course of action for mast and antenna vulnerability countermeasures, continued communications vulnerability assessment, and other acoustic superiority countermeasure validation testing (details classified). Assesses PELAGOS transition to program of record in FY 17 and with follow-on VA Class testing. ***FY 2017 OCO Plans:***					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
N/A					
Title: Payloads and Sensors/Subtotal Cost	10.660	6.671	9.035	0.000	9.035
Articles:	-	-	-	-	-

Description: Develop promising advanced technologies and/or concepts capable of revolutionizing submarine design, improving payload flexibility, increasing capability, reducing weight and space requirements, exploring alternative payload launch mechanisms. Develop rapid payload demonstrations targeted at improving flexible ocean interfaces, Intelligence, Surveillance, Reconnaissance (ISR) requirements and missions payload and launch retrieval methods from undersea platforms, and certification of next generation high-density energy systems for on-board submarine use. Conduct Navy and joint demonstrations in order to assess the operational value of the technologies and systems under consideration. Transition demonstrated high interest systems to the acquisition community. The experiments support examination and assessment of potential new Fleet capabilities.

FY 2015 Accomplishments:
Continued monitoring prototype Towed Array OA-9070B Tensioned Belt Drogue Deployer (TBDD) on the 688 class at-sea. Developing the towed array Dual Belted Diverter (DBD) to replace the guide tube roller boxes to assist the towed body around desired angles and turns. Continued the Towed Array Load Predicting Tool FNC to develop and validate towed array model hydrodynamic load predicting computational tool. Completed the full scale validation array prototype design and fabricated sensors which will be installed on a SSN 688 to provide in-situ loads on deployed towed array, allowing data collection which will provide validation of the FNC tool. Continued submarine integration and Concept of Operations (CONOPs) development in support of AWESUM. Payload completed a successful demonstration of the AWESUM JCTD and prepared a codified transition agreement with NAVAIR (PMW 770 and NAVSEA (PMS 425) program offices. Demonstrated submarine launch Unmanned Aerial System (UAS) capability in support of AWESUM. Performed initial design and analysis on tactical ULRM. Continued integration and testing of innovative payload concepts. Developed preliminary hazard analysis, design battery carriage and battery casualty testing for the Speed to Fleet Lithium Ion Battery certification. Continued Integrated Autonomous Undersea Warfare Surveillance (IAUWS), PA between US and Australia. Design, built vehicle mods, prepared for demonstration, and developed TEMPALT for Fleet Modular Autonomous Underwater Vehicle (FMAUV).

FY 2016 Plans:
Continued monitoring Towed Array OA-9070B TBDD and completion of at-sea demo of the TBDD. Complete development and perform landbased test on the Towed Array OA-9070B Dual Belted Diverter (DBD) and

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Tensioner. Transition to PMS 401. Continue Towed Array Predicting Tool FNC to develop and validate towed array load prediction tool. Conduct landbased and in-water test of the full scale instrumented tool validation array. Initiate UAS integration (AWESUM) collaboration with UK and Australia. Efforts will field the AWESUM system as a mission capability and further improve system reliability. Additionally efforts will mature the Submarine Launched Decoy (SLD) to a relevant configuration for at sea testing. Continue integration and testing of innovative payload concepts. Complete Lithium Ion Battery certification testing and establish follow-on plan for SAFECAP design and TEMPALT package for vehicle carriage. Conduct FMAUV at-sea trial and support transition planning. Additional development of solutions and capabilities to support high power and energy dense systems on submarines. ***FY 2017 Base Plans:*** Continue Towed Array Load Prediction Tool FNC to development and validation. Initiate efforts for submarine integration of advanced UAS payloads and a common communication architecture. Continue integration and testing of innovative payload concepts into off-hull platforms. Demonstrate an autonomous mission capability for Speed to Fleet ISR/EW. Commence Undersea Warfare Rapid Innovation/Prototyping to sustain dominance of USN submarines to include common UAS communications architecture. ***FY 2017 OCO Plans:*** N/A					
Title: Innovative Technology Transition/Concept Development	5.484	4.934	5.632	0.000	5.632
Articles:	-	-	-	-	-
Description: Develop submarine alternative propulsion, propeller designs, and stern configurations with potential to significantly reduce submarine acquisition costs while increasing performance. Demonstrate critical performance parameters through appropriate scale demonstration in realistic environmental conditions. Evaluate integration of technologies and approaches for cost reduction in future submarines. Develop understanding of ship concept studies and submarine cost drivers and model analysis. Develop and demonstrate technologies for future submarines in areas of hull and platform technologies, propulsors, propellers, corrosion control, ship control, electric actuation, sensors, and self-defense. Demonstrate technologies with potential to reduce total ownership costs of submarine systems by lowering construction costs, improving commonality of interfaces, extending the life of parts, and lowering life cycle maintenance requirements. This work will apply to future submarine concept formulation design, technology integration and capabilities studies.					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
FY 2015 Accomplishments: Completed the TEMPALT removal of the Universal Modular Mast (UMM) and Ball Valve Electric Actuation System (EAS from the USS MISSOURI and restored the shipboard hydraulic service systems. Performed Ball Valve EAS data acquisition analysis and actuator tear down assessment. Continued data collection of the Advanced CO2 Removal Unit (ACRU) shipboard test cube on aboard SSBN platform. Planned and developed a TEMPALT to demonstrate Ionic Current Monitoring System (ICMS). Plan and develop one TEMPALT to demonstrate an Advanced Active Shaft Grounding System (AASGS) subsystem technology, Electronic Grounding Unit (EGU) with Grounding Datalog Unit (GDU)). Completed Advanced Active Shaft Grounding System (AASGS) subsystems (Shaft Current Sensor (SCS) and Contact Technologies (CT)) engineering design. Developed Sprayable Acoustics Damping System (SADS) Future Naval Capability (FNC) Business Case Analysis (BCA) for VIRGINIA and Ohio Replacement and finalize SADS formulation. Designed, fabricated and conducted component and system testing and commenced preliminary design of the Advanced Submarine Control (ASC) pump jet. Continue partnership with ONR on the Advanced Material Propeller (AMP) FNC program. Completed full scale Generation 0 (one AMP composite blade and metallic hub) fabrication and structure testing. Continued new concept development/system improvements. Continue to leverage products between Small Business and Independent Research and Development (IR&D) efforts. Develop an Augmented Reality (AR) Information Assurance (IA) plan to support the planned Low Cost Conformal Array (LCCA) installation alternation demonstration. Study concepts and technology options for the Next Generation (NG) Propulsor.					
FY 2016 Plans: Complete data collection of the Advanced CO2 Removal Unit (ACRU) shipboard test cube on aboard SSBN platform. Install ICMS TEMPALT on a VIRGINIA Class hull. Install the AASGS EGU with GDU TEMPALT on a VIRGINIA hull. Plan and develop the AASGS SCS and CT TEMPALTs for demonstration at sea. Complete the design, fabrication and component and system testing and preliminary design of the Advanced Submarine Control (ASC) pump jet. Build and perform the certification testing of the full scale Generation 2 AMP composite blades and metallic hub. Continue new concept development/system improvements. Continue to leverage products between Small Business and IR&D efforts. Commence technology and trade-studies roadmapping to determine potential long lead technology development areas required for future submarine classes. Continue to study concepts and technology options for a Next Generation (NG) Propulsor.					
FY 2017 Base Plans:					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Remove the CO2 SSBN Shipyard test cube. Continue to monitor ICMS TEMPALT at-sea. Install the SCS and CT AASGS TEMPALTs on VA Class platform. Commence monitoring of TEMPALTs at-sea. Deliver full-scale AMP to the Royal Australian Navy for demonstration at-sea on a COLLINS class submarine. Commence design of a multi-material rotor for demonstration on the LSV. Continue new concept development/system improvements. Continue to leverage products between Small Business and Independent Research and Development (IR&D) efforts. Continue SSN(X) roadmapping to determine potential long lead technology development areas required for future submarine classes. Next Generation Propulsor team to evaluate the Defense Advanced Research Projects Agency (DARPA) Hybrid Multi-Material Rotor (HMMR) structural integrity effort and AMP testing the robustness of multi-materials for full scale use on a submarine. ***FY 2017 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	32.179	37.497	49.877	0.000	49.877

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

F2033: Sole source Concept Formulation (CONFORM) contracts with the only two submarine design/construction shipyards, General Dynamics Electric Boat (GDEB) and Huntington Ingalls Industries (HII). Engagement with industry to build vendor base and support development of R&D products for enhanced submarine capability via competitively awarded Small Business Innovation Research (SBIR) and Broad Agency Agreement (BAA) contracts to support Hull Mechanical & Electrical (HM&E) and payload systems.

E. Performance Metrics

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

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- Conduct in-depth assessment of SSN/SSGN Survivability for peacetime and wartime operations in anti-access area denial environment. Respond to emergent fleet tasking to assess real-world vulnerability concerns
- Completion of annual Operational Survivability Assessment for SSN/SSGN.
- Develop future coatings to enable continued acoustic superiority of VA Class design.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2017 Navy			Date: February 2016
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	MIPR	DARPA : Arlington, VA	3.084	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Product Development	MIPR	CNA : Alex, VA	0.690	0.370	Apr 2015	0.500	Feb 2016	0.200	Feb 2017	-		0.200	0.000	1.760	-
Product Development	SS/CPFF	Lockheed Martin : Manassas, VA	1.500	0.000		0.000		0.000		-		0.000	0.000	1.500	-
Product Development	WR	NRL : Washington, DC	0.933	0.490	Apr 2015	0.000		0.000		-		0.000	0.000	1.423	-
Product Development	SS/CPFF	Rolls Royce, Marine North America : New Bedford, MA	1.760	0.820	Mar 2015	2.000	Mar 2016	0.000		-		0.000	0.000	4.580	-
Product Development	SS/CPFF	SupShips : Groton, CT	0.000	2.434	Aug 2015	0.000		0.000		-		0.000	0.000	2.434	-
Product Development	WR	NAVAIR : Pax River, MD	0.000	0.400	Apr 2015	0.000		0.000		-		0.000	0.000	0.400	-
Product Development	SS/CPFF	HII : Newport News, VA	7.641	0.939	Mar 2015	3.419	Apr 2016	4.730	Apr 2017	-		4.730	Continuing	Continuing	Continuing
Product Development	WR	NSWC : Dahlgren, VA	5.261	0.010	May 2015	0.000		0.000		-		0.000	0.000	5.271	5.241
Product Development	SS/CPFF	Kollmorgen : N. Hampton, MA	1.100	0.000		0.000		0.000		-		0.000	0.000	1.100	1.100
Product Development	SS/CPFF	Oceaneering : Chesapeake, VA	1.900	0.000		0.000		0.000		-		0.000	0.000	1.900	1.900
Product Development	SS/CPFF	Boeing : St. Louis, MO	0.925	0.000		0.000		0.000		-		0.000	0.000	0.925	Continuing
Product Development	SS/CPFF	EB : Groton, CT	52.578	5.548	Mar 2015	1.371	Apr 2016	17.104	Apr 2017	-		17.104	Continuing	Continuing	Continuing
Product Development	SS/CPFF	Raytheon : Portsmouth, RI	16.034	0.000		0.000		0.000		-		0.000	0.000	16.034	16.340
Product Development	WR	NSWC : Carderock, MD	83.011	2.458	Mar 2015	3.744	Apr 2016	5.705	Apr 2017	-		5.705	Continuing	Continuing	Continuing
Product Development	SS/CPFF	ARL/PSU : State College, PA	7.642	0.116	Feb 2015	0.566	Apr 2016	0.575	Apr 2017	-		0.575	Continuing	Continuing	Continuing
Product Development	SS/CPFF	UT/ARL : Austin, TX	6.300	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing

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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	SS/CPFF	JHU/APL : Laurel, MD	17.298	1.624	May 2015	7.402	May 2016	1.200	Apr 2017	-		1.200	Continuing	Continuing	Continuing
Product Development	Various	Various : Various	34.259	1.662	Mar 2015	0.000		0.289	Apr 2017	-		0.289	Continuing	Continuing	Continuing
Product Development	WR	NUWC : Newport, RI	69.506	1.713	Feb 2015	1.769	Mar 2016	1.820	Mar 2017	-		1.820	Continuing	Continuing	Continuing
Product Development	WR	ONR : Arlington, VA	8.066	0.575	Mar 2015	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Product Development	SS/CPFF	Lockheed Martin : Bethesda, MD	12.783	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Product Development	WR	SPAWAR : San Diego, CA	5.850	0.290	May 2015	0.000		0.000		-		0.000	0.000	6.140	Continuing
Product Development	C/CPFF	Raytheon : TBD	0.627	0.000		0.000		0.000		-		0.000	0.000	0.627	-
Product Development	C/CPFF	Applied Mathematics : Gales Ferry CT	0.510	0.000		0.000		0.000		-		0.000	0.000	0.510	-
Product Development	SS/CPFF	Progeny : Manassas VA	0.337	0.283	Mar 2015	0.000		0.000		-		0.000	0.000	0.620	-
		Subtotal	339.595	19.732		20.771		31.623		-		31.623	-	-	-

Remarks

Various/VAR is used to group multiple activities with small funding levels.
Activities will be incrementally funded. The award dates reflect the latest incremental portion funds will obligate.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Engineering Support	SS/CPFF	Various : Various	11.004	1.300	Jun 2015	1.313	Jun 2016	1.339	Jun 2017	-		1.339	Continuing	Continuing	Continuing
Government Engineering Support	WR	Various : Various	6.163	0.350	Mar 2015	0.350	Mar 2016	0.350	Mar 2017	-		0.350	Continuing	Continuing	Continuing
Travel	WR	NAVSEA HQ : Not Specified	0.759	0.100	Mar 2015	0.100	Apr 2016	0.100	Mar 2017	-		0.100	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2017 Navy			Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Acquisition Workforce	Various	Not Specified : Not Specified	0.293	0.000		0.000		0.000		-		0.000	0.000	0.293	0.293
		Subtotal	18.219	1.750		1.763		1.789		-		1.789	-	-	-

Remarks

Various/VAR is used to group multiple activities with small funding levels.
Activities will be incrementally funded. The award dates reflect the latest incremental portion funds will obligate.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	SS/CPFF	EB : Groton, CT	11.783	0.215	Jan 2015	1.700	Mar 2016	5.800	May 2017	-		5.800	Continuing	Continuing	Continuing
Developmental Test & Evaluation	SS/CPFF	Raytheon : Portsmouth, VA	9.104	0.000		0.000		0.000		-		0.000	0.000	9.104	9.104
Developmental Test & Evaluation	WR	NAVAIR : Patuxent, MD	2.593	0.000		0.000		0.000		-		0.000	0.000	2.593	2.593
Developmental Test & Evaluation	Various	Various : Various	6.922	0.465	Apr 2015	0.000		0.670	Apr 2017	-		0.670	0.000	8.057	6.372
Developmental Test & Evaluation	WR	NUWC : Newport, RI	20.883	0.000		2.000	Apr 2016	1.250	Apr 2017	-		1.250	Continuing	Continuing	Continuing
Developmental Test & Evaluation	WR	NSWC : Carderock, MD	27.112	7.517	Feb 2015	9.263	Apr 2016	6.745	Apr 2017	-		6.745	Continuing	Continuing	Continuing
Developmental Test & Evaluation	SS/CPFF	HII : Newport News, VA	3.294	2.500	Feb 2015	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Developmental Test & Evaluation	SS/CPFF	JHU/ARL : Laurel, MD	1.805	0.000		2.000	May 2016	2.000	Apr 2017	-		2.000	0.000	5.805	0.305
Developmental Test & Evaluation	SS/CPFF	ARL/PSU : State College, PA	0.720	0.000		0.000		0.000		-		0.000	0.000	0.720	0.720
Developmental Test & Evaluation	WR	NSWC : Dahlgren, VA	1.320	0.000		0.000		0.000		-		0.000	0.000	1.320	1.320

Exhibit R-3, RDT&E Project Cost Analysis: PB 2017 Navy			Date: February 2016
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / *Advanced Submarine System Development*	Project (Number/Name) 2033 / *Adv Submarine Systems Development*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Subtotal			85.536	10.697		14.963		16.465		-		16.465	-	-	-

Remarks

Various/VAR is used to group multiple activities with small funding levels.
Activities will be incrementally funded. The award dates reflect the latest incremental portion funds will obligate.

	Prior Years	FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	443.350	32.179		37.497		49.877		-		49.877	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

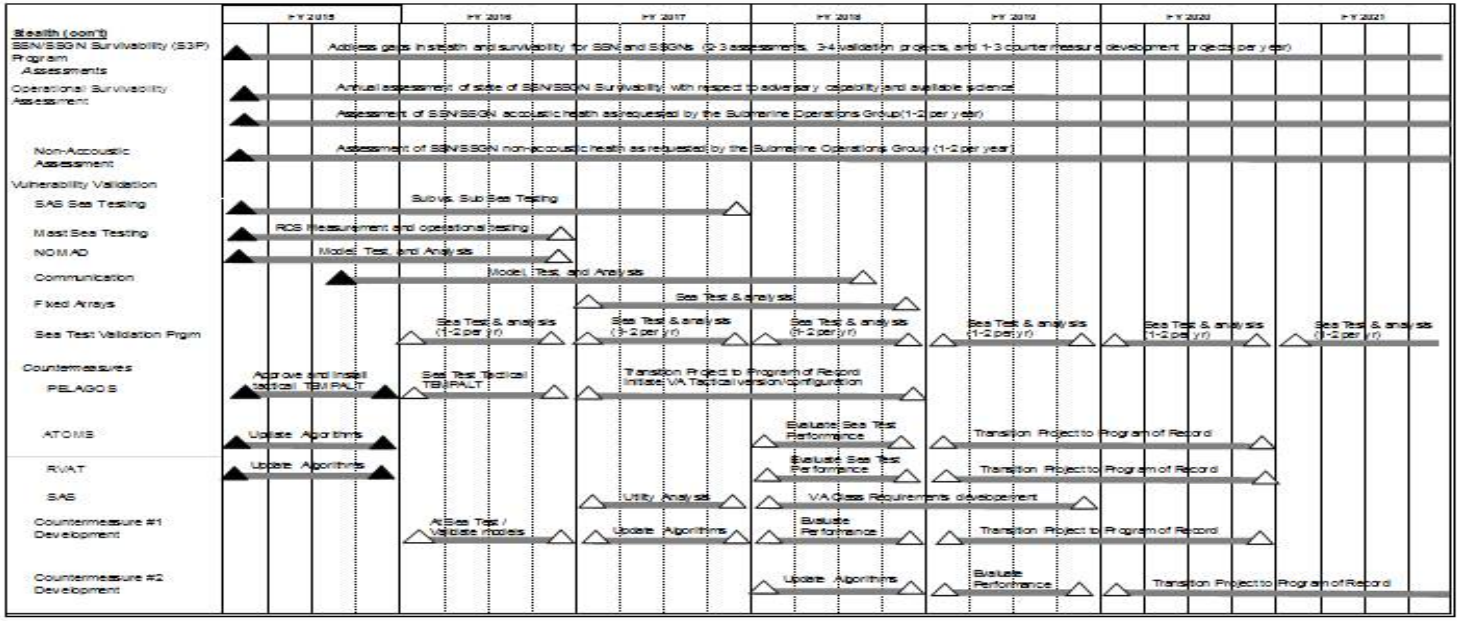
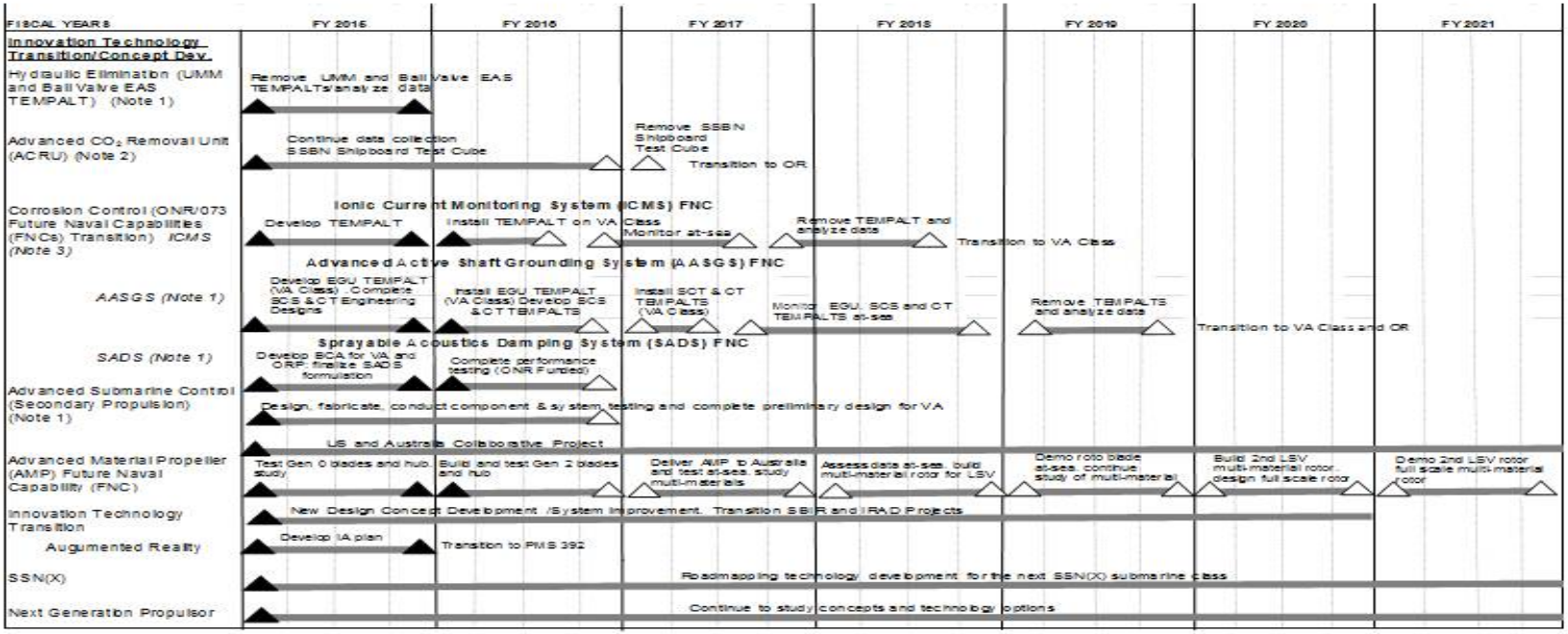


Exhibit R-4, RDT&E Schedule Profile: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*



Note 1: Influence VA Class and OHIO Replacement (OR) Design
Note 2: Transitions to OR
Note 3: Transitions from ONR to SEA073

Exhibit R-4, RDT&E Schedule Profile: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

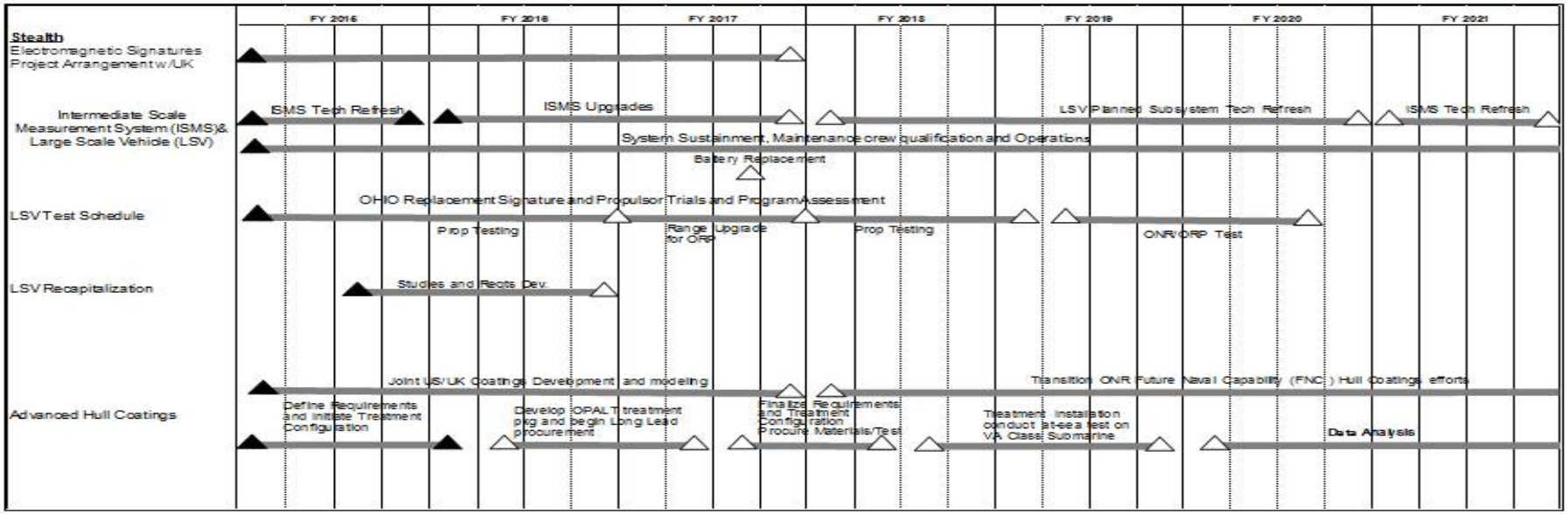


Exhibit R-4, RDT&E Schedule Profile: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

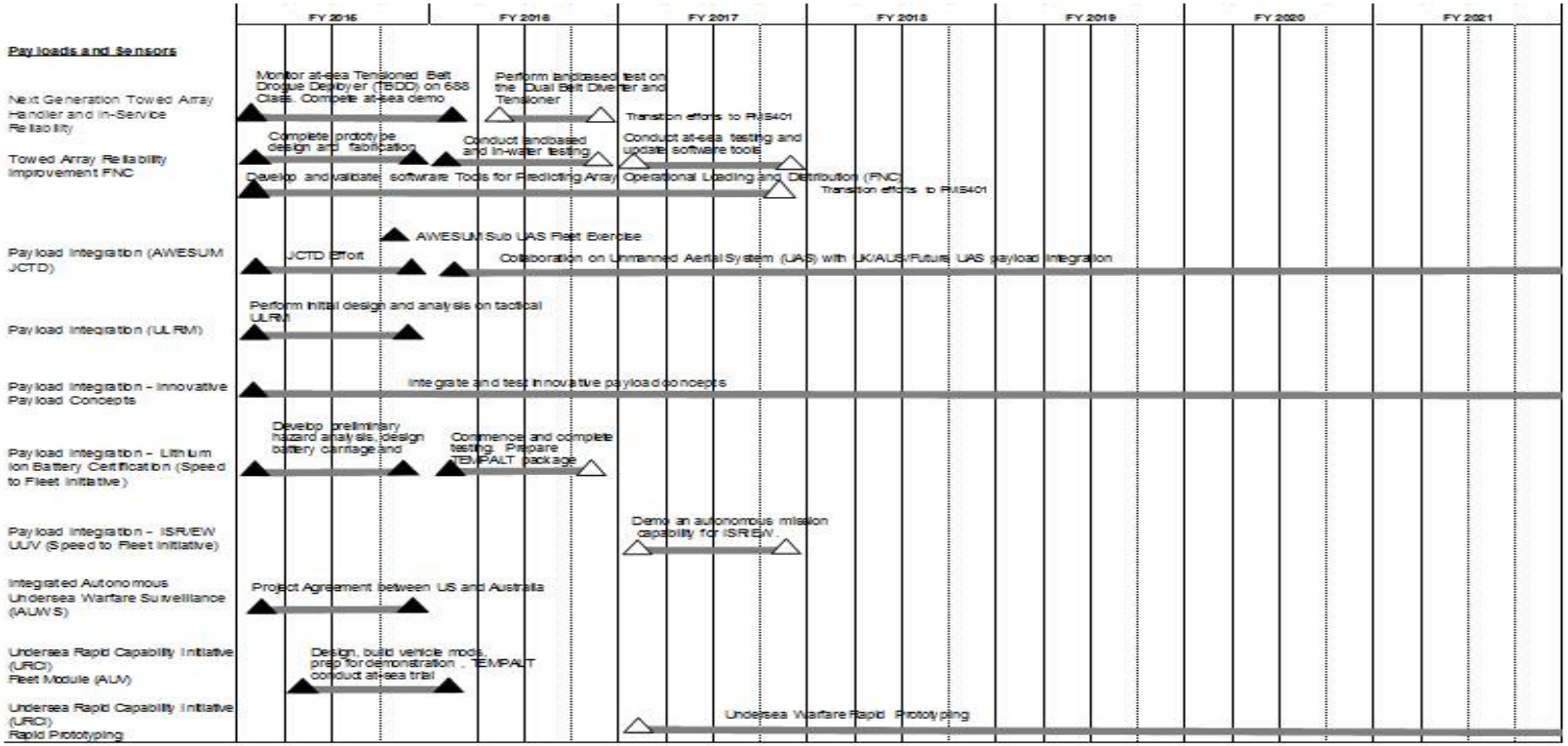


Exhibit R-4A, RDT&E Schedule Details: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
STEALTH				
Electromagnetic Signatures Project Arrangement (PA) w/UK	1	2015	4	2017
Intermediate Scale Measurement System (ISMS)/Large Scale Vehicle (LSV) Tech Refresh	1	2015	4	2015
ISMS/LSV - ISMS Upgrades	1	2016	4	2017
ISMS /LSV Sustainment, Maintenance,Crew Qualification and Operations	1	2015	4	2021
ISMS/LSV Test Schedule OHIO Replacement Program Assessment, Signature and Propulsor Trials	1	2015	3	2020
LSV Recapitalization	3	2015	4	2016
Advanced Hull Coatings - Joint US/UK Coatings Development and Modeling	1	2015	1	2017
Advanced Hull Coatings - Transition ONR FNC Hull Coatings efforts	1	2018	4	2021
Advanced Hull Coatings - Define Requirements/Initiate Treatment Configuration	1	2015	1	2016
Advanced Hull Coatings - Develop OPALT treatment package and begin long lead material procurement	2	2016	2	2017
Advanced Hull Coatings -Finalize requirements and treatment configuration, procure materials and test	3	2017	2	2018
Advanced Hull Coatings - Treatment Installatiion/Conduct At-Sea test on VA Class Sub	3	2018	4	2019
Advanced Hull Coatings - Data Analysis	1	2020	4	2021
SSN/SSGN Survivability (S3P) - Addresses gaps in Stealth survivability for SSNs and SSGNs	1	2015	4	2021
SSN/SSGN Survivability (S3P) - Fleet Security Assessment - Annual Assessment of state of SSN/SSGN Survivability with respect to Adversary capability and available science	1	2015	4	2021

Exhibit R-4A, RDT&E Schedule Details: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
SSN/SSGN Survivability (S3P) - Acoustic Assessment - Assessment of SSN/SSGN acoustic health as requested by the Submarine Operations Group (1-2 per year)	1	2015	4	2021
SSN/SSGN Survivability (S3P) - Non Acoustic Assessment - Assessment of SSN/ SSGN non-acoustic health as requested by the Submarine Operations Group (1-2 per year)	1	2015	4	2021
SSN/SSGN Survivability (S3P) - SAS Sea Testing - Sub vs Sub at-sea testing	1	2015	4	2017
SSN/SSGN Survivability (S3P) - Mast Sea Testing - RCS Measurement and Operational Testing	1	2015	4	2016
SSN/SSGN Survivability (S3P) - NOMAD - Model, test and Analysis	1	2015	4	2016
SSN/SSGN Survivability (S3P) - Communication - Model, Test and Analysis	3	2015	3	2018
SSN/SSGN Survivability (S3P) - Fixed Arrays - Sea Test and Analysis	1	2017	4	2018
SSN/SSGN Survivability (S3P) - Sea Test Validation Program - Sea Test and Analysis	1	2016	4	2021
SSN/SSGN Survivability (S3P) - PELAGOS - Approve and Install tactical TEMPALT	1	2015	4	2015
SSN/SSGN Survivability (S3P) - PELAGOS - Sea Test Tactical TEMPALT	1	2016	4	2016
SSN/SSGN Survivability (S3P) - PELAGOS - Transition Project Program of Record, Initiate VA Tactical version/config.	1	2017	4	2018
SSN/SSGN Survivability (S3P) - ATOMS - Update Algorithms	1	2015	4	2015
SSN/SSGN Survivability (S3P) - ATOMS - Evaluate Sea Test Performance	1	2018	4	2018
SSN/SSGN Survivability (S3P) - ATOMS - Transition Project to Program of Record	1	2019	4	2020
SSN/SSGN Survivability (S3P) - RVAT - Update Algorithms	1	2015	4	2015
SSN/SSGN Survivability (S3P) - RVAT - Evaluate Sea Test Performance	1	2018	4	2018
SSN/SSGN Survivability (S3P) - RVAT - Transition Project to Program of Record	1	2019	4	2020
SSN/SSGN Survivability (S3P) - SAS - Utility Analysis	1	2017	4	2017
SSN/SSGN Survivability (S3P) - SAS - VA Class Requirements Development	1	2018	4	2019
SSN/SSGN Survivability (S3P) - Countermeasure #1 Development - At-sea Test/ Validate Models	1	2016	4	2016

Exhibit R-4A, RDT&E Schedule Details: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
SSN/SSGN Survivability (S3P) - Countermeasure #1 Development - Update Algorithms	1	2017	4	2017
SSN/SSGN Survivability (S3P) - Countermeasure #1 Development - Evaluate Performance	1	2018	4	2018
SSN/SSGN Survivability (S3P) - Countermeasure #1 Development - Transition to Program of Record	1	2019	4	2020
SSN/SSGN Survivability (S3P) - Countermeasure #2 Development - Update Algorithms	1	2018	4	2018
SSN/SSGN Survivability (S3P) - Countermeasure #2 Development - Evaluate Performance	1	2019	4	2019
SSN/SSGN Survivability (S3P) - Countermeasure #2 Development - Transition to Program of Record	1	2020	4	2021
PAYLOADS AND SENSORS: TAHS - Monitor at-sea Tensioned Belt Drogue Deployed (TBDD) on 688 Class. Compete at-sea demo	1	2015	1	2016
PAYLOADS AND SENSORS: TAHS - Perform landbased test on the Dual Belt Diverter and Tensioner. Transfer to PMS 401	2	2016	4	2016
PAYLOADS AND SENSORS: TAHS FNC - Complete prototype design and fabrication	1	2015	4	2015
PAYLOADS AND SENSORS: TAHS FNC - Conduct landbased and in-water testing	1	2016	4	2016
PAYLOADS AND SENSORS: TAHS FNC FNC - Conduct At-sea Testing and update software tools	1	2017	4	2017
PAYLOADS AND SENSORS: TAHS FNC - Develop and validate Towed Array Predicting Tool. Transition to PMS 401	1	2015	4	2017
PAYLOADS AND SENSORS: Payload Integration - AWESUM - Sub UAS Fleet Exercise	4	2015	4	2015
PAYLOADS AND SENSORS: Payload Integration - AWESUM - Concept Development (JCTD)	1	2015	4	2015
PAYLOADS AND SENSORS: Payload Integration - AWESUM - Collaboration on UAS with UK/Australia	1	2016	4	2021

Exhibit R-4A, RDT&E Schedule Details: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
PAYLOADS AND SENSORS: Payload Integration - ULRM - Perform initial design and analysis on tactical ULRM	1	2015	4	2015
PAYLOADS AND SENSORS: Payload Integration - Innovative Payload Concepts	1	2015	4	2021
PAYLOADS AND SENSORS: Payload Integration - Lithium Ion Battery Certification - Develop preliminary hazard analysis, design battery carriage and casualty container (Speed to Fleet Initiative)	1	2015	4	2015
PAYLOADS AND SENSORS: Payload Integration - Lithium Ion Battery Certification - Commence and complete testing. Prepare TEMPALT package (Speed to Fleet Initiative)	1	2016	4	2016
PAYLOADS AND SENSORS: Payload Integration - ISR/EW UUV (Speed to Fleet Initiative) Demo an autonomous mission capability for ISR/EW	1	2017	4	2017
PAYLOADS AND SENSORS: Integrated Autonomous Undersea Warfare Surveillance (IAUWS) - Project Agreement between US and Australia	1	2015	4	2015
PAYLOADS AND SENSORS: Undersea Rapid Capability Initiative (URCI) - Fleet Module (AUV)	2	2015	1	2016
PAYLOADS AND SENSORS: Undersea Rapid Capability Initiative (URCI) - Rapid Prototyping	1	2017	4	2021
INNOVATION TECHNOLOGY TRANSITION/CONCEPT DEVELOPMENT: Hydraulic Elimination UMM and Ball Valve EAS TEMPALTs Removal/analyze data (Informs VA Class and ORP)	1	2015	4	2015
INNOVATION TECHNOLOGY TRANSITION/CONCEPT DEVELOPMENT: Advanced CO2 - Continue Data Collections on the SSBN Shipboard Test Cube	1	2015	4	2016
INNOVATION TECHNOLOGY TRANSITION/CONCEPT DEVELOPMENT: Remove SSBN Shipboard Test Cube - Transition to OR	1	2017	1	2017
INNOVATION TECHNOLOGY TRANSITION/CONCEPT DEVELOPMENT: ICMS - Develop TEMPALT	1	2015	4	2015
INNOVATION TECHNOLOGY TRANSITION/CONCEPT DEVELOPMENT: ICMS - Install TEMPALT on VA Class	1	2016	3	2016

Exhibit R-4A, RDT&E Schedule Details: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
INNOVATION TECHNOLOGY TRANSITION/CONCEPT DEVELOPMENT: ICMS - Monitor At-Sea	4	2016	3	2017
INNOVATION TECHNOLOGY TRANSITION/CONCEPT DEVELOPMENT: ICMS - Remove TEMPALT and analyze data	4	2017	3	2018
INNOVATION TECHNOLOGY TRANSITION/CONCEPT DEVELOPMENT: AASGS - Develop 2 TEMPALTs (EGU and SCS) VA Class. Complete 3rd TEMPALT Engineering Design	1	2015	4	2015
INNOVATION TECHNOLOGY TRANSITION/CONCEPT DEVELOPMENT: AASGS - Install EGU TEMPALT on VA Class and Develop SCS and CT TEMPALTs	1	2016	4	2016
INNOVATION TECHNOLOGY TRANSITION/CONCEPT DEVELOPMENT: AASGS - Install SCT and CT TEMPALTs on VA Class	1	2017	2	2017
INNOVATION TECHNOLOGY TRANSITION/CONCEPT DEVELOPMENT: AASGS - Monitor TEMPALTS at-sea	3	2017	4	2018
INNOVATION TECHNOLOGY TRANSITION/CONCEPT DEVELOPMENT: AASGS - Remove TEMPALTS and analyze data	1	2019	4	2019
INNOVATION TECHNOLOGY TRANSITION/CONCEPT DEVELOPMENT: SADS - Develop BCA for VA and ORP, finalize SADS formulation	1	2015	4	2015
INNOVATION TECHNOLOGY TRANSITION/CONCEPT DEVELOPMENT: SADS - Complete performance testing	1	2016	4	2016
INNOVATION TECHNOLOGY TRANSITION/CONCEPT DEVELOPMENT: Advanced Submarine Control (Secondary Propulsion) - Design, Fab, Conduct Component/ System Testing and complete preliminary design	1	2015	4	2016
INNOVATION TECHNOLOGY TRANSITION/CONCEPT DEVELOPMENT: AMP - US and Australia Collaborative Project	1	2015	4	2021
INNOVATION TECHNOLOGY TRANSITION/CONCEPT DEVELOPMENT: AMP - Test Gen 0 blades and hub, study concept for Next Generation Propulsor	1	2015	4	2015
INNOVATION TECHNOLOGY TRANSITION/CONCEPT DEVELOPMENT: AMP - Build and Test Gen 2 blades and hub, study concepts for Next Generation Propulsor	1	2016	4	2016

Exhibit R-4A, RDT&E Schedule Details: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
INNOVATION TECHNOLOGY TRANSITION/CONCEPT DEVELOPMENT: AMP - Deliver AMP to Australia and Test at-sea, study, multi-materials	1	2017	4	2021
INNOVATION TECHNOLOGY TRANSITION/CONCEPT DEVELOPMENT: AMP - Assess data at-sea, build multi-material rotor for LSV	1	2018	4	2018
INNOVATION TECHNOLOGY TRANSITION/CONCEPT DEVELOPMENT: AMP - Demo roto blade at-sea, continue study of multi-materials	1	2019	4	2019
INNOVATION TECHNOLOGY TRANSITION/CONCEPT DEVELOPMENT: AMP - Build 2nd LSV multi-material rotor, design full scale rotor	1	2020	4	2020
INNOVATION TECHNOLOGY TRANSITION/CONCEPT DEVELOPMENT: AMP - Demo 2nd LSV rotor full scale multi-material rotor	1	2021	4	2021
INNOVATION TECHNOLOGY TRANSITION/CONCEPT DEVELOPMENT: Innovation Technology Transition - New Design Concept/Dev and System Improvements	1	2015	4	2021
INNOVATION TECHNOLOGY TRANSITION/CONCEPT DEVELOPMENT: Innovation Technology Transition - Transitions SBIR and IRAD Projects	1	2015	4	2021
INNOVATION TECHNOLOGY TRANSITION/CONCEPT DEVELOPMENT: Augmented Reality (AR) - Develop Information Asurance (IA) Plan and sail mock up drawings	1	2015	4	2015
INNOVATION TECHNOLOGY TRANSITION/CONCEPT DEVELOPMENT: SSN(X) - Roadmaping technology development for the next SSN(X) submarine class	1	2016	4	2021
INNOVATION TECHNOLOGY TRANSITION/CONCEPT DEVELOPMENT: Next Generation Propulsor - Continue to study concepts and technology options	1	2015	1	2021

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy			Date: February 2016
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / *Advanced Submarine System Development*	Project (Number/Name) 2096 / *Payload Delivery Development*	

COST ($ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
2096: *Payload Delivery Development*	0.000	0.000	0.000	8.392	-	8.392	8.947	20.339	14.170	9.318	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Project established in FY17. Efforts previously funded under Project 2033.

A. Mission Description and Budget Item Justification

Universal Launch and Recovery Module (ULRM) is hardware/middleware for the integration of large deployable and retrievable payloads from submarines. RDT&EN funding will be used to design , manufacture, and field a payload launch and recovery system to be utilized from submarine large ocean interfaces to accommodate large diameter payloads such as the Navy's large diameter unmanned underwater vehicle (LDUUV).

ULRM enables launch and recovery of LDUUV from submarines (SSGN and VA Class VPM and beyond). Launch and recovery of large diameter payloads from submarines does not currently exist. ULRM provides the submarine force with the capability to launch and recover large payloads of various configurations, improving battle space awareness and extending war-fighting reach.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Title: Universal Launch and Recovery Module (ULRM)	0.000	0.000	8.392	0.000	8.392
Articles:	-	-	-	-	-
Description: New Project Unit commencing in FY17. Previous efforts were funded under Project 2033 (Payloads and Sensors).					
FY 2015 Accomplishments: N/A					
FY 2016 Plans: N/A					
FY 2017 Base Plans: Conduct non-recurring engineering design to include shock analysis, modeling, and simulation to support integration of Navy's LDUUV program into the Submarine force.					
FY 2017 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2096 / *Payload Delivery Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
N/A					
Accomplishments/Planned Programs Subtotals	0.000	0.000	8.392	0.000	8.392

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Design, manufacture, and test submarine hosted launch and recovery system. Design effort will be conducted in a program office led teaming arrangement with five different Government activities (NSWC PHIL, NSWC CD, NUWC NPT, NUWC KPT, and PSNS Code 120). Manufacturing will be completed utilizing existing government manufacturing capabilities in conjunction with various small vendor contracts. Testing will be conducted at government facilities and on government owned test ranges.

E. Performance Metrics

Commence design of tactical ULRM system.

- Performing shock analysis, modeling, and simulation at government labs to support design efforts

Exhibit R-3, RDT&E Project Cost Analysis: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2096 / *Payload Delivery Development*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	WR	NUWC NPT : Newport, RI	0.000	0.000		0.000		2.414	Nov 2016	-		2.414	Continuing	Continuing	Continuing
Product Development	WR	NSWC PHIL : Philadelphia, PA	0.000	0.000		0.000		2.414	Nov 2016	-		2.414	Continuing	Continuing	Continuing
Product Development	WR	NUWC KPT : Keyport, WA	0.000	0.000		0.000		1.430	Nov 2016	-		1.430	Continuing	Continuing	Continuing
Product Development	WR	PSNS : Bremerton, WA	0.000	0.000		0.000		1.430	Nov 2016	-		1.430	Continuing	Continuing	Continuing
Product Development	WR	NSWC CD : West Bethesda, MD	0.000	0.000		0.000		0.704	Nov 2016	-		0.704	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		8.392		-		8.392	-	-	-

	Prior Years	FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		0.000		8.392		-		8.392	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2096 / *Payload Delivery Development*

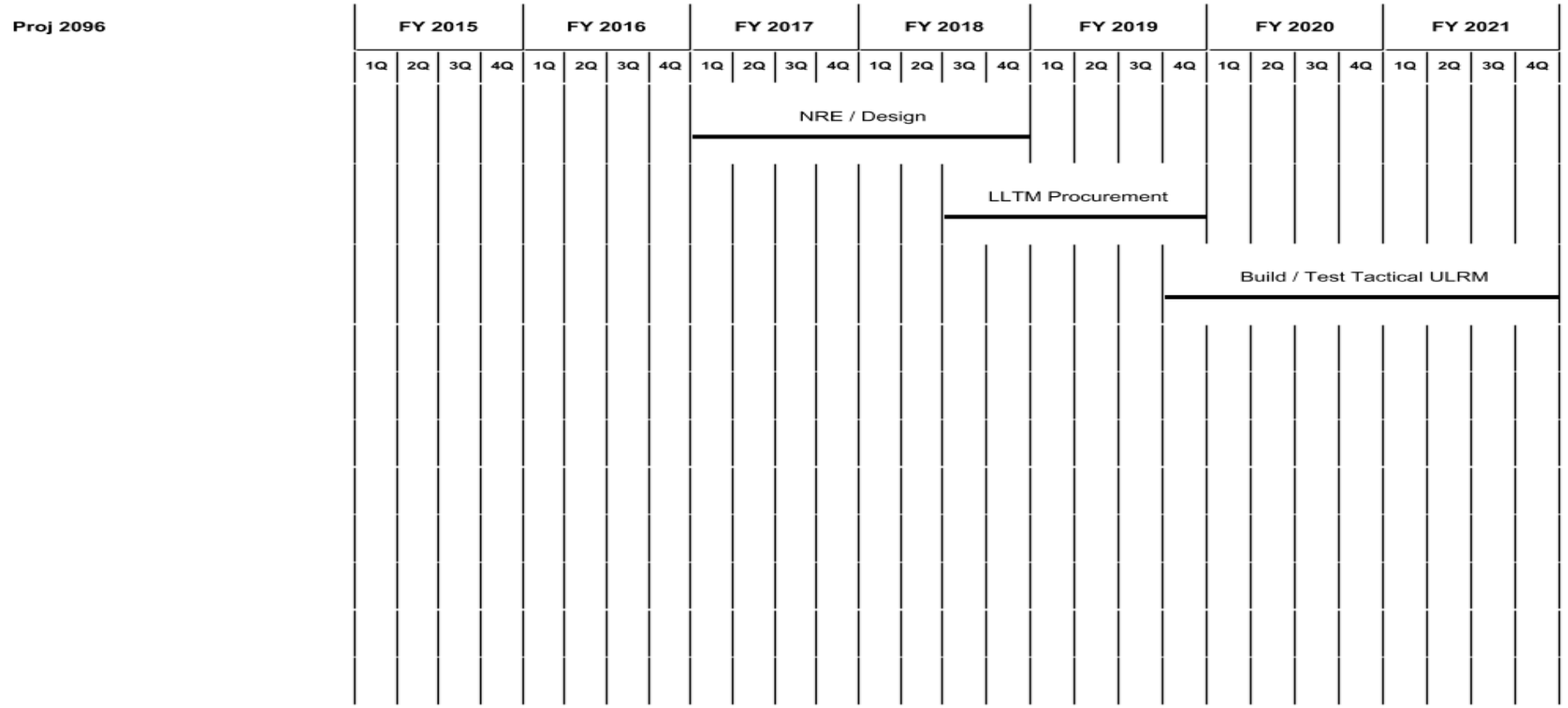


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Exhibit R-4A, RDT&E Schedule Details: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2096 / *Payload Delivery Development*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2096				
Non-Recurring Engineering (NRE) Design	1	2017	4	2018
Long-Lead Time Material procurement	3	2018	4	2019
Manufacture / Test Tactical ULRM	4	2019	4	2021

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy			Date: February 2016
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / *Advanced Submarine System Development*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
9999: *Congressional Adds*	0.000	0.000	10.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	10.000
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016
Congressional Add: Adv Sub Sys Dev (Cong)	0.000	10.000
FY 2015 Accomplishments: N/A		
FY 2016 Plans: Design and develop advanced submarine stealth and controller components and related technologies to mitigate risks, perform hydrodynamic and hydroacoustic analysis on advanced submarine control systems to insure performance requirements are met, perform required land-based and in-water qualification testing (e.g., shock, pressure, EMI), and test and evaluate control system technologies used in external applications using innovative designs and materials to alleviate corrosion and signature issues.		
Congressional Adds Subtotals	0.000	10.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

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

Exhibit R-3, RDT&E Project Cost Analysis: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 9999 / *Congressional Adds*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	WR	NSWC/Carderock : Bethesda, MD	0.000	0.000		2.000	Apr 2016	0.000		-		0.000	0.000	2.000	-
Product Development	WR	NUWC/Newport : Newport, RI	0.000	0.000		0.500	Apr 2016	0.000		-		0.000	0.000	0.500	-
Product Development	WR	NSWC, Phila : Philadelphia, PA	0.000	0.000		0.500	Apr 2016	0.000		-		0.000	0.000	0.500	-
Product Development	WR	NRL : Washington, DC	0.000	0.000		0.500	Apr 2016	0.000		-		0.000	0.000	0.500	-
Product Development	SS/CPFF	Progeny : Manassas, VA	0.000	0.000		3.500	May 2016	0.000		-		0.000	0.000	3.500	-
Product Development	SS/CPFF	Electric Boat : Groton, CT	0.000	0.000		3.000	May 2016	0.000		-		0.000	0.000	3.000	-
		Subtotal	0.000	0.000		10.000		0.000		-		0.000	0.000	10.000	-

	Prior Years	FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		10.000		0.000		-		0.000	0.000	10.000	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 9999 / *Congressional Adds*

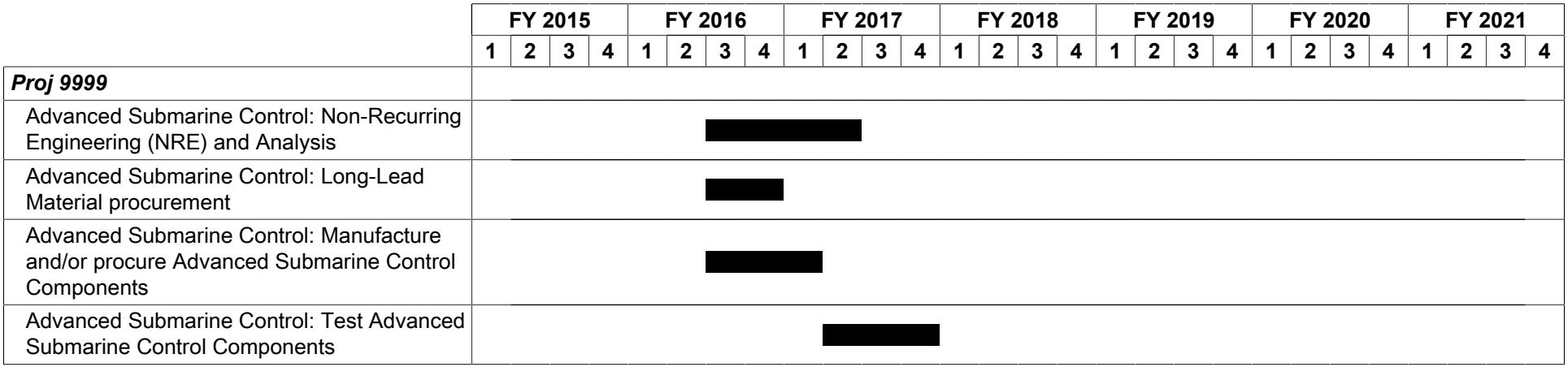

Exhibit R-4A, RDT&E Schedule Details: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 9999 / *Congressional Adds*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 9999				
Advanced Submarine Control: Non-Recurring Engineering (NRE) and Analysis	3	2016	2	2017
Advanced Submarine Control: Long-Lead Material procurement	3	2016	4	2016
Advanced Submarine Control: Manufacture and/or procure Advanced Submarine Control Components	3	2016	1	2017
Advanced Submarine Control: Test Advanced Submarine Control Components	2	2017	4	2017

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