Exhibit R-2, RDT&E Budget Item Justification: PB 2016 Navy											Date: February 2015	
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 2014**	**FY 2015**	**FY 2016 Base**	**FY 2016 OCO**	**FY 2016 Total**	**FY 2017**	**FY 2018**	**FY 2019**	**FY 2020**	**Cost To Complete**	**Total Cost**
Total Program Element	2,772.968	832.736	67.551	87.160	-	87.160	91.055	82.759	92.031	92.111	Continuing	Continuing
0223: *Sub Combat System Improvement (ADV)*	383.293	31.734	34.787	41.392	-	41.392	44.925	41.482	51.903	51.154	Continuing	Continuing
2033: *Adv Submarine Systems Development*	402.482	40.868	32.764	41.968	-	41.968	46.130	41.277	40.128	40.957	Continuing	Continuing
2096: *Payload Delivery Development*	0.000	-	-	3.800	-	3.800	-	-	-	-	-	3.800
3220: *SBSD Advanced Submarine System Development*	1,987.193	760.134	-	-	-	-	-	-	-	-	-	2,747.327
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 Unit 0223:
The Advanced Submarine Combat Systems Development non-acquisition (NON-ACAT) Project supports Navy Submarine Acoustic Superiority and Technology Insertion Initiatives through the application of advanced development and testing of sensor processing and 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. Specifically, the focus of the technology efforts will be Advanced Processing Build (APB) for acoustics, imaging, tactical control, Electronic Warfare (EW) and navigation; and Advanced Sonar Arrays. APBs develop and demonstrate improvements to current and future sensor processing/combat control systems. The Advanced Sonar Arrays program develops and tests new sensors and demonstrates large array configurations. This Project is funded under demonstration and validation, as it develops and integrates hardware for experimental tests related to specific platform applications. Technologies and/or capabilities developed under this program 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. ACB, ASB and APB may co-develop capabilities and modular architecture technologies to maximize commonality and cost effectiveness.

Exhibit R-2, RDT&E Budget Item Justification: PB 2016 Navy	Date: February 2015
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603561N *I Advanced Submarine System Development*

Project Unit 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 FY14)
- 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
- Hybrid Multi-Material Rotor Development (HMMR) (Completes in FY14)

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 (ULRM)) and Lithium Ion Battery Certification on an Unmanned Undersea Vehicle

- Integrated Autonomous Undersea Warfare Sensor (IAUWS)

Project 2096:
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.

Project Unit 3220:
The objective of the Sea Based Strategic Deterrent (SBSD) Advanced Submarine System Development project is to design and prepare for construction of the replacement of the OHIO Class SSBN.

B. Program Change Summary ($ in Millions)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
Previous President's Budget	850.062	70.551	72.144	-	72.144
Current President's Budget	832.736	67.551	87.160	-	87.160
Total Adjustments	-17.326	-3.000	15.016	-	15.016
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-3.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	6.897	-			
• SBIR/STTR Transfer	-24.222	-			
• Program Adjustments	-	-	19.053	-	19.053
• Rate/Misc Adjustments	-0.001	-	-4.037	-	-4.037

Change Summary Explanation

The FY 2016 funding request was reduced by $3.466 million to account for the availability of prior year execution balances.

FY 2014: BTR supported efforts included ULRM and Acoustic Superiority.

Project 0223: FY 2016 Program Adjustments support Flank Array beam forming and signal processing improvements, and development of Electronic Warfare (EW) improvements.

Project 2033: FY 2016 Program Adjustments support SSN/SSGN Survivability (S3P) improvements.

Project 2096: Project established in FY16. Efforts previously funded under 2033.

Exhibit R-2, RDT&E Budget Item Justification: PB 2016 Navy	Date: February 2015
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*

Note: Beginning in 2015, there is an administrative change that will shift efforts funded from PE 0603561N (Advanced Submarine System Development) / Project 3220 to PE 0603595N (Ohio Replacement) / Project 3220. This shift is consistent with Congressional intent identified in HR 933 (FY13).

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy			Date: February 2015
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 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
0223: *Sub Combat System Improvement (ADV)*	383.293	31.734	34.787	41.392	-	41.392	44.925	41.482	51.903	51.154	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project Unit 0223: The Advanced Submarine Combat Systems Development Non-ACAT program 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. Specifically, the focus of the technology efforts are APBs for acoustics, imaging, electronic warfare, tactical control, navigation, and Advanced Sonar Arrays. APBs develop and demonstrate improvements to current and future sensor processing/combat control systems. The Advanced Sonar Arrays program develops and tests new sensors and demonstrates large array configurations. Technologies and/or capabilities developed here are shared to optimize re-use and cost effectiveness with surface and surveillance programs. ACB, ASB and APB may co-develop capabilities and modular architecture technologies to maximize commonality and cost effectiveness.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
Title: Advanced Processing Build (APB)	29.834	31.587	36.117	-	36.117
Articles:	-	-	-	-	-

FY 2014 Accomplishments:

Continued development of APB-13 focusing on revitalizing Operator Machine Interfaces (OMI) to apply commercial industry design thinking and technologies to support ease of use and reduced training burden; continued improvement of new passive acoustic ranging techniques and automated contact tracking; enhanced software architecture to improve system reliability; improved periscope image clarity, image automation, and tracking; and continued refinement of technologies initiated in APB-11. Completed land-based testing of APB-13, including laboratory string testing, end-to-end system testing and Return On Investment (ROI) testing, using the Submarine Multi-Mission Team Trainer (SMMTT). Conducted at-sea testing of APB-13. Used the product of FY14 Return on Investment (ROI), Watch Station Task Analysis (WSTA) gaps and seams, and Broad Agency Announcement (BAA) evaluations along with direction from the Fleet, Submarine Tactical Requirements Group (STRG), COMSUBFOR, and N97 to establish content and continue the development of capabilities for APB-15. APB-15 development will include initial improvements to Electronic Warfare (EW) for Direction

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy		Date: February 2015
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 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
Finding, Vulnerability Assessment and Open Systems Architecture; continued revitalization of User Interfaces through the application of commercial design thinking and common commercial user Geographical (GEO) User interfaces such as Google Earth; continued development of the Submarine Mission Planning capability; continued development of imaging improvements for integration/fusion of multi-spectral capability and automated tools for visual detection, tracking, classification and ranging; continued on-board combat system reconstruction, automated sonar detection capabilities, on-board adaptive training tools, adaptation of display technologies to multi-touch displays; improvements to Sonar Tactical Decision Aid (STDA); automated contact of concern determination and initial steps towards porting surface ship Mid-Frequency Active (MFA) sonar capability into the submarine tactical system. APB tactical scenarios and capability focus areas are provided by the Submarine Fleet via the STRG, COMSUBFOR and CNO N97. ***FY 2015 Plans:*** Continue the development of APB-15, integrate APB-15 for testing, and initiate the land-based testing of APB-15, including laboratory string testing. Initiate planning for APB-17 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-13. ***FY 2016 Base Plans:*** Use the product of FY15 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 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. ***FY 2016 OCO Plans:*** N/A					
Title: Flank Array Demonstration	-	-	1.675	-	1.675
Articles:	-	-	-	-	-
FY 2014 Accomplishments:					

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy		Date: February 2015
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 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
N/A ***FY 2015 Plans:*** N/A ***FY 2016 Base Plans:*** Commence development of beamforming and signal processing improvements to maximize Low Frequency Active (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 for the Large Vertical Aperture (LVA-2) array on USS Maryland in support of Acoustic Superiority goals. Note: One at-sea test per year will be conducted FY16-19. ***FY 2016 OCO Plans:*** N/A					
Title: Advanced Sensors	1.900	3.200	3.600	-	3.600
Articles:	-	-	-	-	-
FY 2014 Accomplishments: Conducted Light Weight (LW) Low Cost Conformal Array (LCCA) sea test and transition to 688I program. Initiated studies for development of sensors for the Ohio Class Replacement Program (ORP). Conducted at-sea testing of Conformal Acoustic Velocity Sonar (CAVES) array and updated processor suite. Continued development and test of Advanced Towed Array technologies. Transitioned Compact Towed Array (CTA) technology and supported deployment of CTA 12X Advanced Development Model (ADM) array to PEO Submarines. Initiated development of 96-channel Fat Line VSTA prototype array. Developed open architecture Interface Control Document (ICD) for embedded sensors. ***FY 2015 Plans:*** Continue LWLCCA development and testing with extension of technology to VA class. Complete 96-channel Fat Line VSTA prototype array development. Conduct Factory Acceptance Testing (FAT), environmental testing and calibration of Fat Line VSTA prototype. Conduct lake test and data analysis. ***FY 2016 Base Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy		Date: February 2015
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 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
Evaluate options for next generation towed array based on analysis of performance, reliability, and affordability. Options to be evaluated include vector sensor and embedded sensor technologies. Initiate development of next generation towed array. ***FY 2016 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	31.734	34.787	41.392	-	41.392

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Use competitively awarded contracts from Broad Agency Announcement (BAA) solicitations and Small Business Innovative Research (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 Light Weight Low Cost Conformal Array (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 2016 Navy		Date: February 2015
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 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	C/CPFF	Adaptive Methods : VA	0.925	-		-		-		-		-	Continuing	Continuing	Continuing
Product Development	C/CPFF	Alion Sciences : VA	3.267	-		-		-		-		-	-	3.267	Continuing
Product Development	C/CPFF	Arete : CA	0.000	0.150	Feb 2014	0.400	Jan 2015	0.900	Dec 2015	-		0.900	Continuing	Continuing	Continuing
Product Development	C/CPFF	Chesapeake Science (L-3) : MD	7.376	0.175	Jan 2014	-		-		-		-	-	7.551	Continuing
Product Development	C/CPFF	Electric Boat : ME	1.765	-		-		-		-		-	-	1.765	Continuing
Product Development	C/CPFF	General Dynamics : VA	15.997	2.100	Dec 2013	2.500	Dec 2014	2.500	Dec 2015	-		2.500	Continuing	Continuing	Continuing
Product Development	C/CPFF	GA Tech Research Institute : GA	2.916	0.050	Jan 2014	0.050	Dec 2014	0.100	Dec 2015	-		0.100	Continuing	Continuing	Continuing
Product Development	C/CPFF	In Depth Engineering : VA	3.900	0.600	Jan 2014	0.750	Dec 2014	1.000	Dec 2015	-		1.000	Continuing	Continuing	Continuing
Product Development	C/CPFF	JHU/APL : MD	71.476	7.357	Jan 2014	8.710	Dec 2014	6.550	Dec 2015	-		6.550	Continuing	Continuing	Continuing
Product Development	C/CPFF	Lockheed Martin : VA	43.127	4.650	Dec 2013	5.700	Dec 2014	8.185	Dec 2015	-		8.185	Continuing	Continuing	Continuing
Product Development	C/CPFF	Lockheed Martin : NY	8.914	0.650	Feb 2014	-		-		-		-	-	9.564	Continuing
Product Development	C/CPFF	Metron : VA	4.158	0.500	Dec 2013	1.250	Dec 2014	2.250	Dec 2015	-		2.250	Continuing	Continuing	Continuing
Product Development	WR	NSWC/Carderock : MD	24.550	0.650	Nov 2013	1.000	Nov 2014	1.800	Nov 2015	-		1.800	Continuing	Continuing	Continuing
Product Development	WR	NUWC/Newport : RI	77.144	3.900	Nov 2013	4.334	Nov 2014	4.996	Nov 2015	-		4.996	Continuing	Continuing	Continuing
Product Development	C/CPAF	NSMA : VA	9.844	0.650	Feb 2014	0.650	Jan 2015	0.650	Dec 2015	-		0.650	Continuing	Continuing	Continuing
Product Development	WR	ONI : DC	2.295	-		-		-		-		-	-	2.295	Continuing
Product Development	WR	ONR : VA	2.725	-		-		-		-		-	-	2.725	Continuing
Product Development	C/CPFF	Progeny : VA	5.918	0.850	Dec 2013	0.280	Dec 2014	0.700	Dec 2015	-		0.700	Continuing	Continuing	Continuing
Product Development	C/CPFF	PSU/ARL : PA	7.280	1.200	Feb 2014	0.600	Dec 2014	1.400	Dec 2015	-		1.400	Continuing	Continuing	Continuing
Product Development	C/CPFF	SAIC : VA	3.555	-		-		-		-		-	-	3.555	Continuing
Product Development	C/CPFF	Sedna Digital : VA	8.464	0.900	Dec 2013	1.400	Dec 2014	2.250	Dec 2015	-		2.250	Continuing	Continuing	Continuing
Product Development	WR	SSC/San Diego : CA	1.663	0.150	Dec 2013	0.600	Dec 2014	-		-		-	-	2.413	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2016 Navy			Date: February 2015
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 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	MIPR	U.S. Army Research Lab : MD	1.700	-		-		-		-		-	-	1.700	Continuing
Product Development	MIPR	U.S. Army/MITRE : NJ	4.595	-		-		-		-		-	-	4.595	Continuing
Product Development	MIPR	U.S. Hanscom AFB/ MIT Lincoln Labs : MA	13.184	1.000	Dec 2013	1.500	Jan 2015	3.500	Dec 2015	-		3.500	Continuing	Continuing	Continuing
Product Development	C/CPFF	UT/ARL : TX	24.366	1.960	Feb 2014	1.860	Feb 2015	1.000	Dec 2015	-		1.000	Continuing	Continuing	Continuing
Product Development	C/CPFF	VAR : VAR*	16.984	2.882	Dec 2013	1.844	Dec 2014	2.553	Dec 2015	-		2.553	Continuing	Continuing	Continuing
		Subtotal	368.088	30.374		33.428		40.334		-		40.334	-	-	-

Remarks

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

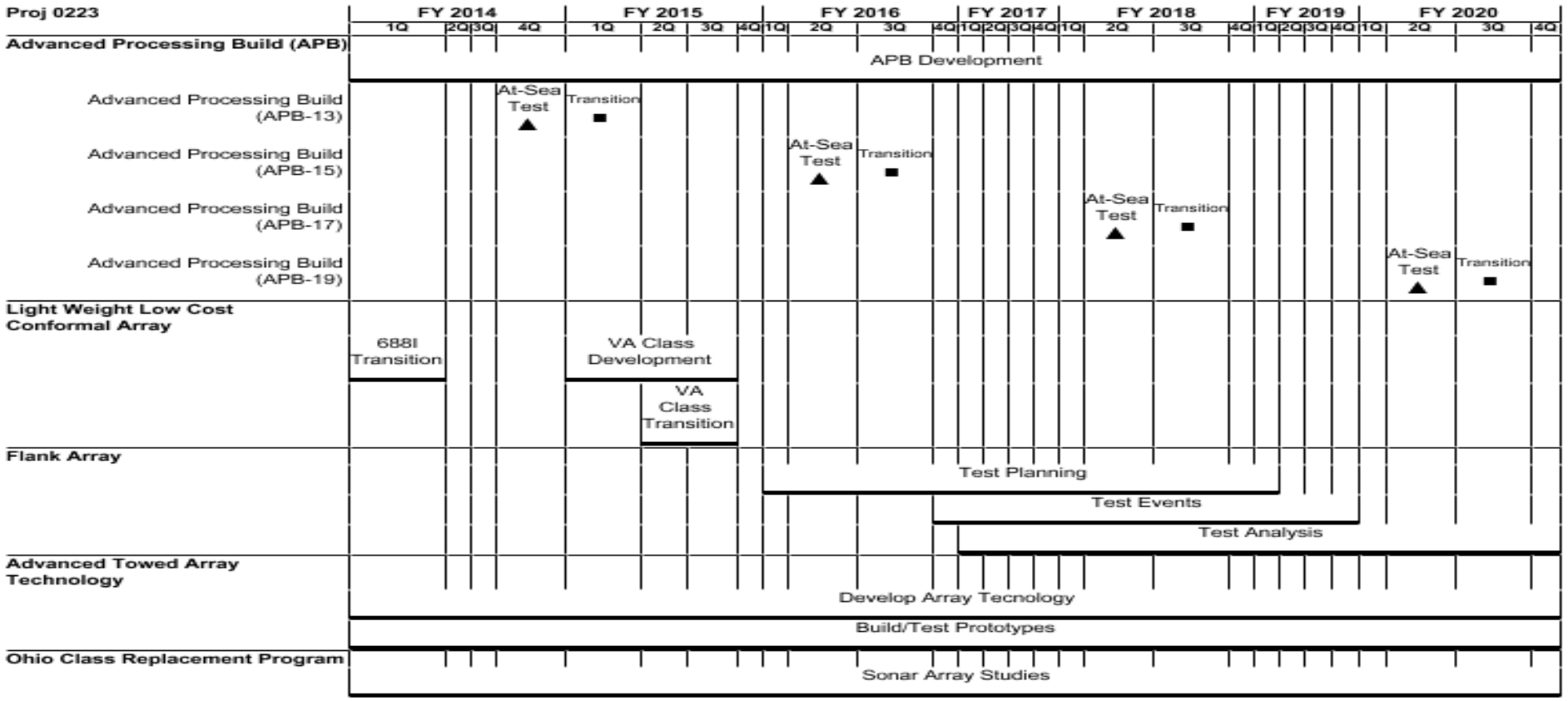
Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	C/CPAF	BAE Systems : MD	11.215	0.700	Dec 2013	0.750	Nov 2014	1.000	Dec 2015	-		1.000	Continuing	Continuing	Continuing
Program Management Support	C/CPFF	EG&G (URS) : VA	3.430	0.600	Mar 2014	0.550	Dec 2014	-		-		-	-	4.580	Continuing
Travel	Allot	NAVSEA PEO IWS5 : DC	0.560	0.060	Feb 2014	0.059	Nov 2014	0.058	Oct 2015	-		0.058	Continuing	Continuing	Continuing
		Subtotal	15.205	1.360		1.359		1.058		-		1.058	-	-	-

	Prior Years	FY 2014		FY 2015		FY 2016 Base		FY 2016 OCO		FY 2016 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	383.293	31.734		34.787		41.392		-		41.392	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2016 Navy		Date: February 2015
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)*



2016PB - 0603561N - 0223

Exhibit R-4A, RDT&E Schedule Details: PB 2016 Navy		Date: February 2015
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)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 0223				
Advanced Processing Build (APB): APB Development (continued)	1	2014	4	2020
Advanced Processing Build (APB): Advanced Processing Build (APB-13): APB-13 At-Sea Test	4	2014	4	2014
Advanced Processing Build (APB): Advanced Processing Build (APB-13): Transition APB-13 to PEO Submarines Production Programs	1	2015	1	2015
Advanced Processing Build (APB): Advanced Processing Build (APB-15): APB-15 At-Sea Test	2	2016	2	2016
Advanced Processing Build (APB): Advanced Processing Build (APB-15): Transition APB-15 to PEO Submarines Production Programs	3	2016	3	2016
Advanced Processing Build (APB): Advanced Processing Build (APB-17): APB-17 At-Sea Test	2	2018	2	2018
Advanced Processing Build (APB): Advanced Processing Build (APB-17): Transition APB-17 to PEO Submarines Production Programs	3	2018	3	2018
Advanced Processing Build (APB): Advanced Processing Build (APB-19): APB-19 At-Sea Test	2	2020	2	2020
Advanced Processing Build (APB): Advanced Processing Build (APB-19): Transition APB-19 to PEO Submarines Production Programs	3	2020	3	2020
Light Weight Low Cost Conformal Array: Transition to 688I (continued)	1	2014	1	2014
Light Weight Low Cost Conformal Array: VA Class Development Extension	1	2015	3	2015
Light Weight Low Cost Conformal Array: Transition to VA Class	2	2015	3	2015
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

Exhibit R-4A, RDT&E Schedule Details: PB 2016 Navy		Date: February 2015
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)*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Advanced Towed Array Technology: Develop Array Technologies (continued)	1	2014	4	2020
Advanced Towed Array Technology: Build & Test Prototype Arrays (continued)	1	2014	4	2020
Ohio Class Replacement Program: Conduct Ohio Class Repacement Array Studies (Continued)	1	2014	4	2020

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy			Date: February 2015
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*	

COST ($ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
2033: *Adv Submarine Systems Development*	402.482	40.868	32.764	41.968	-	41.968	46.130	41.277	40.128	40.957	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Advanced Submarine Systems Development (ASSD) Program is a non-acquisition program that develops and matures 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 FY14)
- 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

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy		Date: February 2015
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*

- Hybrid Multi-Material Rotor Development (HMMR) (Completes in FY14)
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 (ULRM)) and Lithium Ion Battery Certification on an Unmanned Undersea Vehicle
- Integrated Autonomous Undersea Warfare Surveillance (IAUWS)

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
Title: Stealth/Subtotal Cost	21.932	18.183	29.971	-	29.971
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) in support of VIRGINIA and OHIO Replacement Class Program of Records to conduct large model experiments for submarines focusing on stealth, maneuvering and control, affordability, and operational effectiveness. Address gaps in stealth and survivability for current and future SSN/SSGN force. 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.

FY 2014 Accomplishments:
Continued Electromagnetic Silencing PA with the UK executing the fourth (four planned) scale stress magnetization and electric model experiments. Continued technology and sensors refresh at ISMS range. Conducted LSV core system maintenance, maintained crew qualification, maintained support systems, and operated and maintained LSV and ISMS acoustic test ranges. Supported Ohio Replacement time-critical Science and Technology (S&T) trials. Supported ship and system alterations to safely support OHIO Replacement signature and propulsor trials. Conducted VIRGINIA Improved Advanced Hybrid (IAH) test. Addressed gaps in stealth and survivability for current and future SSN/SSGN force to execute submarine tactical and strategic operations. Participated in Triumph v Dallas exercise. Signed Project Agreement for Advanced Hull Coatings.

FY 2015 Plans:

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
Continue Electromagnetic Silencing PA with the UK executing the follow-on efforts for scale stress magnetization and electric model experiments. Complete technology and sensors refresh at ISMS range. Conduct LSV core systems maintenance, maintain crew qualification, maintain support systems, and operate and maintain LSV and ISMS acoustic test ranges. Complete VIRGINIA Improved Advanced Hybrid (IAH) test. Continue supporting ship and system alterations to safely support OHIO Replacement signature and propulsor trials. Prepare for and conduct LSV program Independent Assessment. Conduct critical OHIO Replacement propulsor trials. Address gaps in stealth and survivability for current and future SSN/SSGN force to execute submarine tactical and strategic operations. Define US/UK requirements for coatings, initiate advanced coating configurations for analysis and modeling. Define requirements and initiate Treatment Configuration. ***FY 2016 Base Plans:*** Continue Electromagnetic Silencing PA with the UK executing the follow-on efforts for scale stress magnetization and electric model experiments. Conduct LSV core systems maintenance, maintain crew qualification, maintain support systems, and operate and maintain LSV and ISMS acoustic test ranges. Conduct system upgrades on ISMS. 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. Address gaps in stealth and survivability for current and future SSN/SSGN force to execute submarine tactical and strategic operations. Conduct advanced coating tests for US and UK materials. Finalize requirements and Treatment Configuration, procure materials and test. ***FY 2016 OCO Plans:*** N/A					
Title: Payloads and Sensors/Subtotal Cost	12.574	8.693	6.726	-	6.726
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 payload demonstrations targeted at improving flexible ocean interfaces, Intelligence, Surveillance, Reconnaissance (ISR) requirements, and payload and launch retrieval methods from undersea platforms. Conduct Navy and joint demonstrations in order to assess the operational value of the technologies and systems under consideration. The experiments support examination and assessment of potential new Fleet capabilities.					
FY 2014 Accomplishments:					

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
Completed 688 Class OA-9070B Handling System TEMPALT, install and monitor at-sea. Initiated Tools for Predicting Array Operational Loading and Distribution (FNC). Continued submarine integration CONOPs development in support of AWESUM. Demonstrated submarine launch Unmanned Aerial System (UAS) capability in support of AWESUM. Updated Universal Launch and Recovery Module (ULRM) TEMPALT data package, prepare test plan and Interface Control Document (ICD) and initiate vehicle testing. Commenced preparation of at-sea demonstration for ULRM. Initiated integration and testing of innovative payload concepts. Integrated Autonomous Undersea Warfare Surveillance (IAUWS) Coalition Warfare Program (CWP) Project Agreement (PA) between US and Australia. ***FY 2015 Plans:*** Continue monitoring 688 Class OA-9070B at-sea. Transition efforts to PMS401. Continued Tools for Predicting Array Operational Loading and Distribution (FNC). Towed Array Predicting Tooling FNC to develop and validate towed array predicting tool. Continue submarine integration CONOPs development in support of AWESUM. Demonstrate submarine launch UAS capability in support of AWESUM. Complete ULRM vehicle testing and commence preparation for at-sea demo test. Develop preliminary hazard analysis, design battery carriage and casualty container for the Lithium Ion Battery. Continue integration and testing of innovative payload concepts. Continue IAUWS PA between US and Australia. ***FY 2016 Base Plans:*** Continue Towed Array Predicting Tooling FNC to develop and validate towed array predicting tool. Initiate UAS integration (AWESUM) collaboration with UK and Australia. Commence and complete Lithium Ion Battery certification testing and prepare TEMPALT package. Continue integration and testing of innovative payload concepts. ***FY 2016 OCO Plans:*** N/A					
Title: Innovative Technology Transition/Concept Development	6.362	5.888	5.271	-	5.271
Articles:	-	-	-	-	-
Description: Develop submarine alternative propulsion, propeller designs, and stern configurations with potential to significantly reduce submarine acquisition costs. Demonstrate critical performance parameters through appropriate scale demonstrators 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,					

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
electric actuation, sensors, and self-defense. This work will apply to future submarine designs including the long-lead concept work on the OHIO Replacement Program. 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. ***FY 2014 Accomplishments:*** Commenced the Ball Valve Electric Actuation System (EAS) and Universal Modular Mast (UMM) EAS TEMPALT removal from USS MISSOURI and analyzed data. Removed CO2 SSN Shipboard Test Cube. Continued data collection of the CO2 shipboard test cube aboard SSBN platform. Completed Ionic Current Monitoring System (ICMS) engineering design. Completed Advanced Active Shaft Grounding System (AASGS) engineering design (Electronic Grounding Unit (EGU), Shaft Current Sensor (SCS) and Grounding Datalog Unit (GDU) subsystems). Established Sprayable Acoustic Damping System (SADS) material formulation, define performance requirements and perform ship integration studies and industrialization Test and Evaluation (T&E). Assemble Advanced Submarine Control (ASC) secondary propulsion system technology components and perform factory and land-based component testing. Continued partnership with ONR on the Advanced Material Propeller (AMP) Future Naval Capability (FNC) program. Executed AMP program between U.S. and AUS via a collaborative Project Arrangement (PA) to demonstrate a full scale AMP design on an Australian Collins Class. Completed the design, fabrication and testing of 1/4 scale AMP composite material blade plank and completed the design and fabrication of a full scale Generation 0 composite blade for testing. Tested DARPA Hybrid Multi-Material Rotor (HMMR) solution on LSV 2. Continued new design concept development/system improvements. Continued to leverage products between Small Business and Independent Research and Development (IRAD) efforts. ***FY 2015 Plans:*** Complete the Ball Valve Electric Actuation System (EAS) and Universal Modular Mast (UMM) EAS TEMPALT removal from USS MISSOURI and restore the shipboard hydraulic service systems. Perform Ball Valve EAS data acquisition analysis and actuator tear down assessment. Continue data collection of the CO2 shipboard test cube aboard SSBN platform. Remove CO2 SSBN Shipboard test cube. Plan and develop a TEMPALT to demonstrate ICMS. Plan and develop two TEMPALTs to demonstrate AASGS subsystem technologies (EGU and SCS with GDU). Complete AASGS subsystem Contact Technologies engineering design. Develop SADS Business Case Analysis (BCA) for VIRGINIA and Ohio Replacement. Perform shock and vibration tests and medium-scale damping tests. Perform on land and in-water barge functional testing of an integrated ASC pump jet SPS. Continue partnership with ONR on the AMP FNC program. Obtain AMP structural materials design					

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
approval and complete full-scale Generation 0 composite blade testing. Complete the design and fabrication of a full scale Generation 1 AMP composite blade and metallic hub for structural testing. Initiate the design of a full scale Generation 2 AMP composite blade and metallic hub for structural and certification testing. Continue new concept development/system improvements. Continue to leverage products between Small Business and IRAD efforts. ***FY 2016 Base Plans:*** Install ICMS TEMPALT on a VIRGINIA Class hull. Install two AASGS subsystem TEMPALTs (EGU and SCS with GDU on a VIRGINIA hull). Plan and develop a third TEMPALT to demonstrate an additional AASGS subsystem (Contact Technology) . Complete SADS corrosion performance assessment and conduct large-scale damping performance test. Perform SADS assessment of restraint requirements and develop TEMPALT. Perform in-water barge and on land functional testing of an integrated ASC secondary propulsion system. Complete the design and fabrication of the full scale Generation 2 AMP composite blade and metallic hub. Continue new design concept development/system improvements. Continue to leverage products between Small Business and IRAD efforts. ***FY 2016 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	40.868	32.764	41.968	-	41.968

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) 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 R&D hydroacoustic infrastructure enabling the design and assessment of VIRGINIA Class and OHIO Replacement designs.

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy		Date: February 2015
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*

- Refine the design of the Advanced Carbon Dioxide Removal System (ACRU) CO2 Scrubber System based on at-sea testing of new solid sorbent materials and the removal of liquid amine system from future submarines.
- At-sea demo of AWESUM.
- Assess as-built VIRGINIA and OHIO Class SSN/SSGN submarine for design drivers/design tools and model validation to define R&D needs for OHIO Class component development and technical design maturity.
- Develop and test innovative Towed Array Handler concept focused on improving system reliability and fleet operational availability.
- Conduct in depth assessment of SSN/SSGN Survivability (S3P) for peacetime and wartime operations in anti-access area denial environment.
- Develop future coatings to enable continued acoustic superiority of VA Class design.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2016 Navy			Date: February 2015
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / *Advanced Submarine System Development*	Project (Number/Name) 2033 / *Adv Submarine Systems Development*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	MIPR	DARPA : Arlington, VA	3.084	-		-		-		-		-	Continuing	Continuing	Continuing
Product Development	MIPR	CNA : Alex, VA	0.200	0.490	Feb 2014	0.200	Feb 2015	0.200	Feb 2016	-		0.200	-	1.090	-
Product Development	SS/CPFF	Lockheed Martin : Manassas, VA	1.500	-		-		-		-		-	-	1.500	-
Product Development	WR	NRL : Washington, DC	0.000	0.933	Mar 2014	-		-		-		-	-	0.933	-
Product Development	SS/CPFF	Rolls Royce, Marine North America : New Bedford, MA	0.000	1.760	Jul 2014	1.694	Mar 2015	2.000	Mar 2016	-		2.000	-	5.454	-
Product Development	SS/CPFF	HII : Newport News, VA	5.226	2.415	May 2014	3.517	Mar 2015	3.419	Apr 2016	-		3.419	Continuing	Continuing	Continuing
Product Development	WR	NSWC : Dahlgren, VA	5.241	0.020	Jun 2014	-		-		-		-	-	5.261	5.241
Product Development	SS/CPFF	Kollmorgen : N. Hampton, MA	1.100	-		-		-		-		-	-	1.100	1.100
Product Development	SS/CPFF	Oceaneering : Chesapeake, VA	1.900	-		-		-		-		-	-	1.900	1.900
Product Development	SS/CPFF	Boeing : St. Louis, MO	0.925	-		-		-		-		-	-	0.925	Continuing
Product Development	SS/CPFF	EB : Groton, CT	45.387	7.191	May 2014	4.882	Mar 2015	2.371	Apr 2016	-		2.371	Continuing	Continuing	Continuing
Product Development	SS/CPFF	Raytheon : Portsmouth, RI	16.034	-		-		-		-		-	-	16.034	16.340
Product Development	WR	NSWC : Carderock, MD	78.426	4.585	May 2014	2.165	Feb 2015	4.215	Apr 2016	-		4.215	Continuing	Continuing	Continuing
Product Development	SS/CPFF	ARL/PSU : State College, PA	6.187	1.455	Jun 2014	0.966	Feb 2015	0.566	Apr 2016	-		0.566	Continuing	Continuing	Continuing
Product Development	SS/CPFF	UT/ARL : Austin, TX	6.250	0.050	Jun 2014	-		-		-		-	Continuing	Continuing	Continuing
Product Development	SS/CPFF	JHU/APL : Laurel, MD	15.794	1.504	Jun 2014	2.874	May 2015	10.202	May 2016	-		10.202	Continuing	Continuing	Continuing
Product Development	Various	Various : Various	33.492	0.767	Jul 2014	0.980	Mar 2015	-		-		-	Continuing	Continuing	Continuing
Product Development	WR	NUWC : Newport, RI	61.030	8.476	Jul 2014	2.249	Feb 2015	1.769	Mar 2016	-		1.769	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2016 Navy			Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	WR	ONR : Arlington, VA	8.066	-		-		-		-		-	Continuing	Continuing	Continuing
Product Development	SS/CPFF	Lockheed Martin : Bethesda, MD	12.783	-		-		-		-		-	Continuing	Continuing	Continuing
Product Development	WR	SPAWAR : San Diego, CA	5.850	-		-		-		-		-	-	5.850	Continuing
Product Development	C/CPFF	Raytheon : TBD	0.000	0.627	Aug 2014	0.505	Mar 2015	-		-		-	-	1.132	-
Product Development	C/CPFF	Applied Mathematics : Gales Ferry CT	0.000	0.510	Jun 2014	-		-		-		-	-	0.510	-
Product Development	SS/CPFF	Progeny : Manassas VA	0.000	0.337	Jul 2014	-		-		-		-	-	0.337	-
		Subtotal	308.475	31.120		20.032		24.742		-		24.742	-	-	-

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 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Engineering Support	SS/CPFF	Various : Various	10.132	0.872	Jul 2014	1.300	Jun 2015	1.313	Jun 2016	-		1.313	Continuing	Continuing	Continuing
Government Engineering Support	WR	Various : Various	5.833	0.330	May 2014	0.350	Mar 2015	0.350	Mar 2016	-		0.350	Continuing	Continuing	Continuing
Travel	WR	NAVSEA HQ : Not Specified	0.659	0.100	Aug 2014	0.100	Mar 2015	0.100	Apr 2016	-		0.100	Continuing	Continuing	Continuing
Acquisition Workforce	Various	Not Specified : Not Specified	0.293	-		-		-		-		-	-	0.293	0.293
		Subtotal	16.917	1.302		1.750		1.763		-		1.763	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2016 Navy			Date: February 2015
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 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 Total Cost	Cost To Complete	Total Cost	Target Value of Contract

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 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	SS/CPFF	EB : Groton, CT	11.314	0.469	May 2014	0.215	Jan 2015	2.200	Mar 2016	-		2.200	Continuing	Continuing	Continuing
Developmental Test & Evaluation	SS/CPFF	Raytheon : Portsmouth, VA	9.104	-		-		-		-		-	-	9.104	9.104
Developmental Test & Evaluation	WR	NAVAIR : Patuxent, MD	2.593	-		-		-		-		-	-	2.593	2.593
Developmental Test & Evaluation	Various	Various : Various	6.722	0.200	Jul 2014	0.465	Mar 2015	-		-		-	-	7.387	6.372
Developmental Test & Evaluation	WR	NUWC : Newport, RI	19.258	1.625	May 2014	-		2.000	Apr 2016	-		2.000	Continuing	Continuing	Continuing
Developmental Test & Evaluation	WR	NSWC : Carderock, MD	22.471	4.641	May 2014	7.802	Feb 2015	9.263	Apr 2016	-		9.263	Continuing	Continuing	Continuing
Developmental Test & Evaluation	SS/CPFF	HII : Newport News, VA	3.083	0.211	Jun 2014	2.500	Feb 2015	-		-		-	Continuing	Continuing	Continuing
Developmental Test & Evaluation	SS/CPFF	JHU/ARL : Laurel, MD	0.505	1.300	Jun 2014	-		2.000	May 2016	-		2.000	-	3.805	0.305
Developmental Test & Evaluation	SS/CPFF	ARL/PSU : State College, PA	0.720	-		-		-		-		-	-	0.720	0.720
Developmental Test & Evaluation	WR	NSWC : Dahlgren, VA	1.320	-		-		-		-		-	-	1.320	1.320
		Subtotal	77.090	8.446		10.982		15.463		-		15.463	-	-	-

Remarks

Various/VAR is used to group multiple activities with small funding levels.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2016 Navy		Date: February 2015
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*

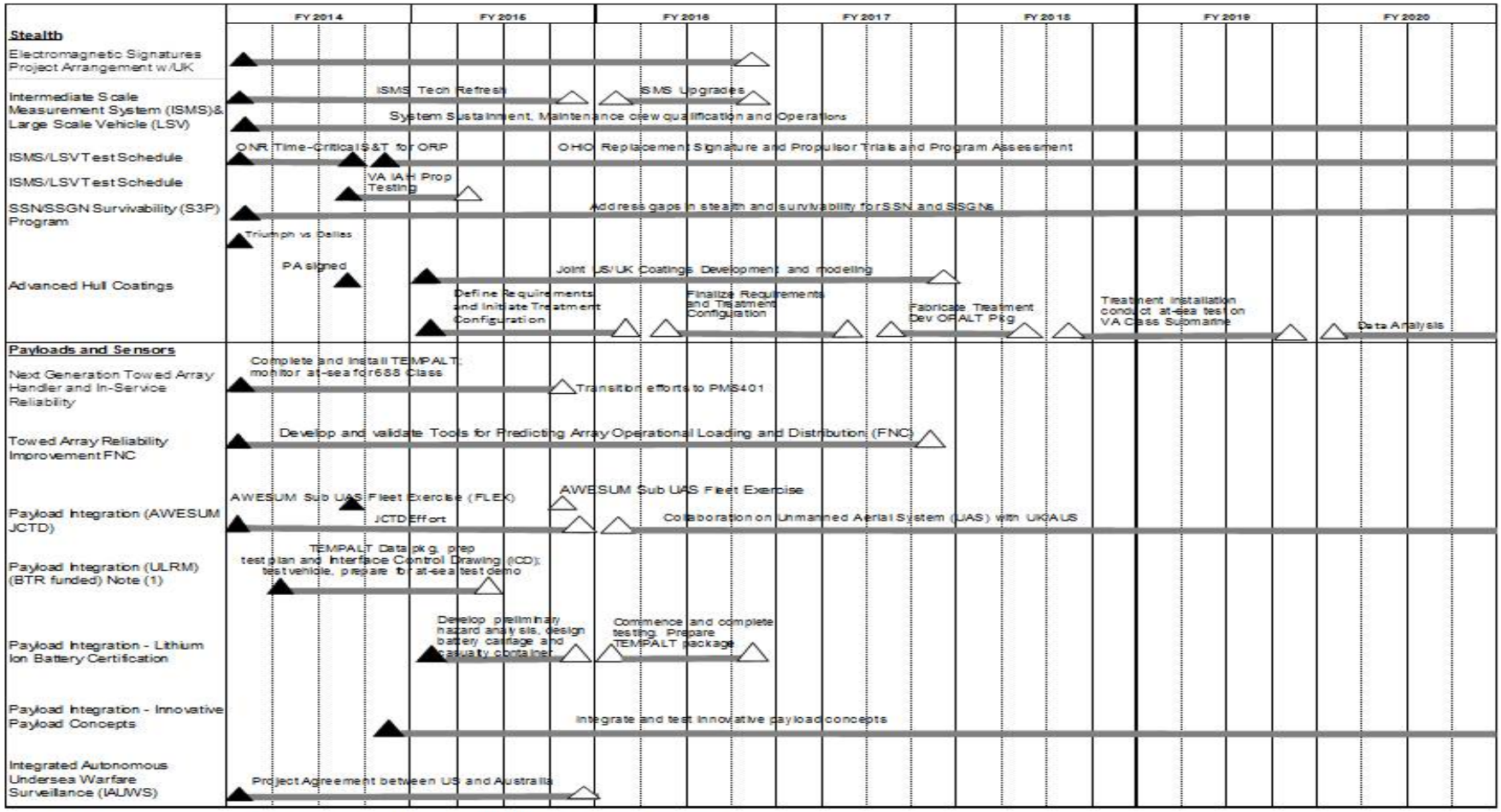
Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Activities will be incrementally funded. The award dates reflect the latest incremental portion funds will obligate.															

	Prior Years	FY 2014		FY 2015		FY 2016 Base		FY 2016 OCO		FY 2016 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	402.482	40.868		32.764		41.968		-		41.968	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2016 Navy		Date: February 2015
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: Funds provided via BTR in FY14. ULRM transfers to Project 2096 in FY16.

Exhibit R-4, RDT&E Schedule Profile: PB 2016 Navy		Date: February 2015
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*

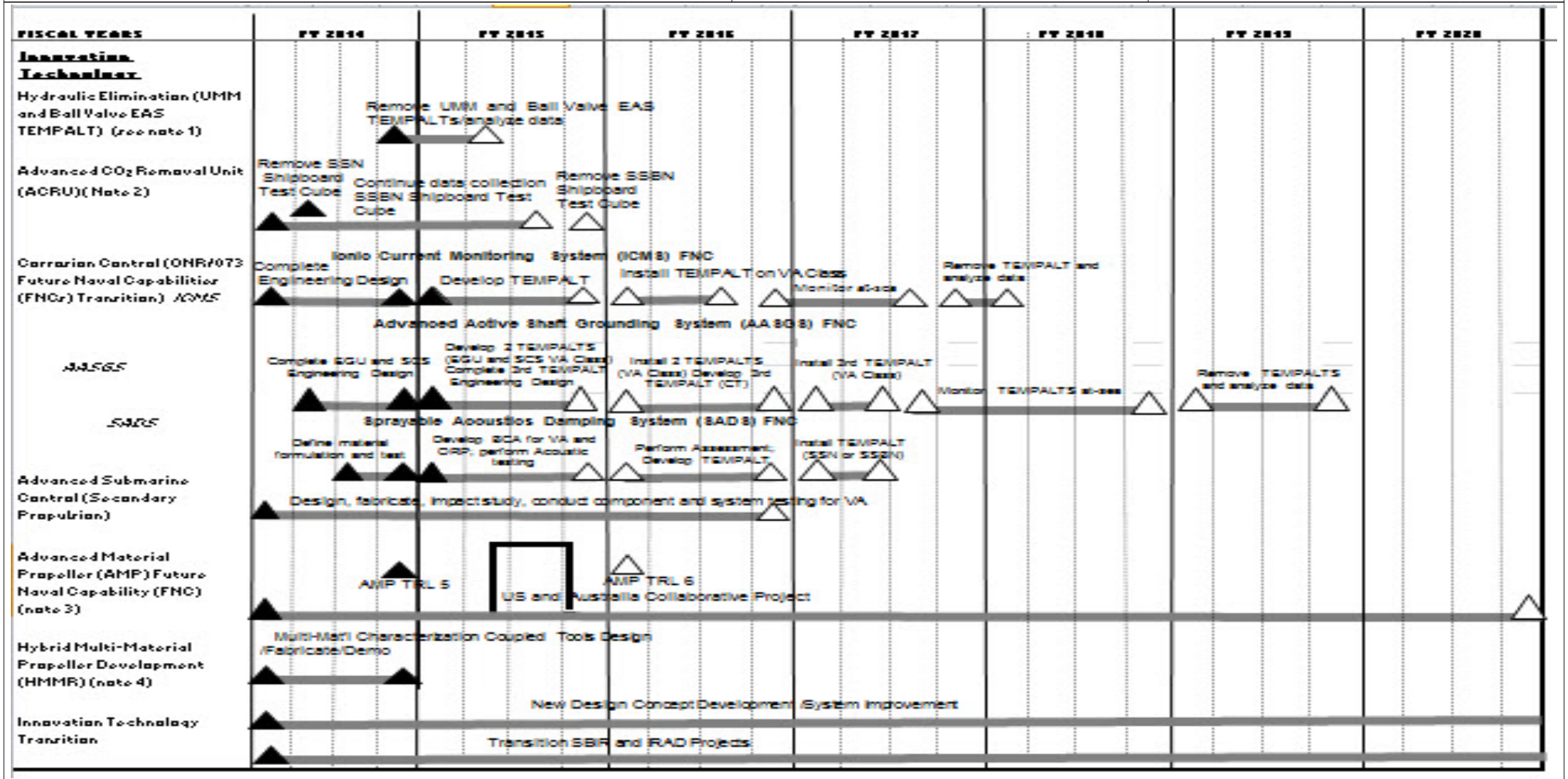


Exhibit R-4A, RDT&E Schedule Details: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2033				
Stealth: Electromagnetic Signatures Project Arrangement (PA) w/UK	1	2014	4	2016
Stealth: Intermediate Scale Measurement System (ISMS)/Large Scale Vehicle (LSV) Tech Refresh	1	2014	4	2015
Stealth: ISMS/LSV - ISMS Upgrades	1	2016	4	2016
Stealth: ISMS /LSV Sustainment, Maintenance,Crew Qualification and Operations	1	2014	4	2020
Stealth: ISMS/LSV Test Schedule - ONR Time Critical S&T for ORP	1	2014	3	2014
Stealth: ISMS/LSV Test Schedule OHIO Replacement Program Assessment, Signature and Propulsor Trials	4	2014	4	2020
Stealth: ISMS/LSV Test Schedule VA Blk IV Testing, Improved Advanced Hybrid (IAH) Propulsor	3	2014	2	2015
Stealth: SSN/SSGN Survivability (S3P) - Triumph v Dallas	1	2014	1	2014
Stealth: SSN/SSGN Survivability (S3P) - Addresses gaps in Stealth survivability for SSNs and SSGNs	1	2014	4	2020
Stealth: Advanced Hull Coatings - PA signed	3	2014	3	2014
Stealth: Advanced Hull Coatings - Joint US/UK Coatings Development and Modeling	1	2015	4	2017
Stealth: Advanced Hull Coatings - Define Requirements/Initiate Treatment Configuration	1	2015	1	2016
Stealth: Advanced Hull Coatings - Finalize Requiremtns and Treatment Configuration/ Procure Materials	2	2016	2	2017
Stealth: Advanced Hull Coatings - Fabricate Treatment/ Dev OPALT Pkg	3	2017	2	2018
Stealth: Advanced Hull Coatings - Treatment Installatiion/Conduct At-Sea test on VA Class Sub	3	2018	4	2019
Stealth: Advanced Hull Coatings - Data Analysis	1	2020	4	2020

Exhibit R-4A, RDT&E Schedule Details: PB 2016 Navy		Date: February 2015
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: TAHS - Complete TEMPALT, install and monitor at-sea for 688 Class	1	2014	4	2015
Payloads and Sensors: TAHS - Develop and validate Towed Array Predicting Tool FNC	1	2014	4	2017
Payloads and Sensors: Payload Integration - AWESUM - Sub UAS FLEX	3	2014	3	2014
Payloads and Sensors: Payload Integration - AWESUM - Sub UAS Fleet Exercise	4	2015	4	2015
Payloads and Sensors: Payload Integration - AWESUM - Concept Development (JCTD)	1	2014	4	2015
Payloads and Sensors: Payload Integration - AWESUM - Collaboration on UAS with UK/Australia	1	2016	4	2020
Payloads and Sensors: Payload Integration - ULRM (BTR) - Update TEMPALT Data pkg, prep Test Plan and ICD, test vehicle, prep for At-Sea Demo	2	2014	2	2015
Payloads and Sensors: Payload Integration - Lithium Ion Battery Certification - Develop preliminary hazard analysis, design battery carriage and casualty container	1	2015	4	2015
Payloads and Sensors: Payload Integration - Lithium Ion Battery Certification - Commence and complete testing. Prepare TEMPALT package.	1	2016	4	2016
Payloads and Sensors: Payload Integration - Innovative Payload Concepts	4	2014	4	2020
Payloads and Sensors: Integrated Autonomous Undersea Warfare Surveillance (IAUWS) - Project Agreement between US and Australia	1	2014	4	2015
Innovation Technology Transition/Concept Development: Hydraulic Elimination UMM and Ball Valve EAS TEMPALTs Removal/analyze data (Informs VA Class and ORP)	4	2014	2	2015
Innovation Technology Transition/Concept Development: Advanced CO2 - Remove SSN Shipboard Test Cube	2	2014	2	2014
Innovation Technology Transition/Concept Development: Advanced CO2 - Continue Data Collections on the SSBN Shipboard Test Cube	1	2014	3	2015
Innovation Technology Transition/Concept Development: Remove SSBN Shipboard Test Cube	4	2015	4	2015

Exhibit R-4A, RDT&E Schedule Details: PB 2016 Navy		Date: February 2015
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: Corrosion Control Ionic Current Monitoring System (ICMS) FNC - Complete Engineering Design	1	2014	4	2014
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	2017
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	1	2018
Innovation Technology Transition/Concept Development: Advanced Active Shaft Grounding System (AASGS) FNC - Complete Engineering Design	2	2014	4	2014
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 2 TEMPALTs on VA Class and Develop 3rd TEMPALT	1	2016	4	2016
Innovation Technology Transition/Concept Development: AASGS - Install 3rd TEMPALT 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: Sprayable Acoustics Damping System (SADS) FNC - Define material formulation and test	3	2014	4	2014
Innovation Technology Transition/Concept Development: SADS - Develop BCA for VA and ORP, perform acoustic testing	1	2015	4	2015
Innovation Technology Transition/Concept Development: SADS - Perform assessment, develop TEMPALT	1	2016	4	2016
Innovation Technology Transition/Concept Development: SADS - Install TEMPALT on SSN or SSBN	1	2017	2	2017

Exhibit R-4A, RDT&E Schedule Details: PB 2016 Navy		Date: February 2015
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: Advanced Submarine Control (Secondary Propulsion) - Design, Fab, Conduct Component/System Testing	1	2014	4	2016
Innovation Technology Transition/Concept Development: AMP TRL -5	4	2014	4	2014
Innovation Technology Transition/Concept Development: AMP TRL -6	1	2016	1	2016
Innovation Technology Transition/Concept Development: AMP - US and Australia Collaborative Project	1	2014	4	2020
Innovation Technology Transition/Concept Development: Hybrid Multi-Material Propeller Dev (HMMR) - Characterization Coupled Design Tools/Fabricate/demo	1	2014	4	2014
Innovation Technology Transition/Concept Development: Innovation Technology Transition - New Design Concept/Dev and System Improvements	1	2014	4	2020
Innovation Technology Transition/Concept Development: Innovation Technology Transition - Transitions SBIR and IRAD Projects	1	2014	4	2020

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy			Date: February 2015
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 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
2096: *Payload Delivery Development*	-	-	-	3.800	-	3.800	-	-	-	-	-	3.800
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Project established in FY16. Efforts previously funded under Project 2033.

A. Mission Description and Budget Item Justification

Demonstrate the launch and recovery of large Unmanned Undersea Vehicle (UUV) from an SSGN for a large diameter open ocean interface.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
Title: Universal Launch and Recovery Module (ULRM)	-	-	3.800	-	3.800
Articles:	-	-	-	-	-
Description: New Project Unit commencing in FY16. Previous efforts were funded under Project 2033 (Payloads and Sensors). ***FY 2014 Accomplishments:*** Efforts performed under Project 2033. ***FY 2015 Plans:*** N/A ***FY 2016 Base Plans:*** Conduct ULRM at-sea demonstration. Commence Tactical Unit design for ULRM. ***FY 2016 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	-	-	3.800	-	3.800

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2096 / *Payload Delivery Development*

D. Acquisition Strategy

Develop requirements for Tactical Units in order to refine cost estimates.

E. Performance Metrics

Conduct successful at-sea test.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2016 Navy		Date: February 2015
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 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	WR	NUWC : Newport, RI	0.000	-		-		0.100	Dec 2015	-		0.100	-	0.100	-
Product Development	SS/CPFF	Electric Boat : Groton, EB	0.000	-		-		0.700	Dec 2015	-		0.700	-	0.700	-
		Subtotal	0.000	-		-		0.800		-		0.800	-	0.800	-

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test and Evaluation	C/CPFF	Electric Boat : Groton, CT	0.000	-		-		2.800	Dec 2015	-		2.800	-	2.800	-
Test and Evaluation	WR	NUWC : Newport, RI	0.000	-		-		0.200	Dec 2015	-		0.200	-	0.200	-
		Subtotal	0.000	-		-		3.000		-		3.000	-	3.000	-

	Prior Years	FY 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	-		-		3.800		-		3.800	-	3.800	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2096 / *Payload Delivery Development*

	FY 2014				FY 2015				FY 2016				FY 2017				FY 2018				FY 2019				FY 2020			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Proj 2096																												
Payload Integration - Universal Launch and Recovery Module (ULRM) Conduct at-sea test; commence tactical design									[redacted]																			

Exhibit R-4A, RDT&E Schedule Details: PB 2016 Navy		Date: February 2015
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				
Payload Integration - Universal Launch and Recovery Module (ULRM) Conduct at-sea test; commence tactical design	1	2016	4	2016

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy									Date: February 2015			
Appropriation/Budget Activity 1319 / 4					R-1 Program Element (Number/Name) PE 0603561N / *Advanced Submarine System Development*				Project (Number/Name) 3220 / *SBSD Advanced Submarine System Development*			
COST ($ in Millions)	**Prior Years**	**FY 2014**	**FY 2015**	**FY 2016 Base**	**FY 2016 OCO**	**FY 2016 Total**	**FY 2017**	**FY 2018**	**FY 2019**	**FY 2020**	**Cost To Complete**	**Total Cost**
3220: *SBSD Advanced Submarine System Development*	1,987.193	760.134	-	-	-	-	-	-	-	-	-	2,747.327
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Note: Beginning in 2015, there is an administrative change that will shift efforts funded from PE 0603561N (SBSD Advanced Submarine System Development) / Project 3220 to PE 0603595N (Ohio Replacement) / Project 3220. This shift is consistent with Congressional intent identified in HR 933 (FY13).

The Sea Based Strategic Deterrent (SBSD) Advanced Submarine System Development project supports the OHIO Replacement (OR) program. The funding applies to the design, systems engineering, prototyping, and vendor qualification activities needed to execute the schedule for Common Missile Compartment (CMC) design, whole ship design, and component technologies development for the next generation U.S. ballistic missile submarine. This RDT&E program supports cooperation with the United Kingdom (UK) to maintain strategic deterrence, based on a single effort to develop a CMC as agreed by the UK Secretary of State for Defence and the U.S. Secretary of Defense in 2009.

The OHIO Replacement program strategy is to maximize the re-use of existing OHIO systems and new designs from the SEAWOLF and VIRGINIA Classes (as applicable), focus on Life Cycle Total Ownership Cost (TOC) affordability, and meet the military requirements established for this SSBN to achieve mission success in a challenging environment. The requested funding levels provide for the Technology Development, Design, and Engineering Integration efforts necessary to support the OHIO Replacement SSBN lead ship construction start in FY 2021.

The following key activities support a ship acquisition program to replace the OHIO Class SSBNs:

1. Design and development of a missile compartment, launch system, and strategic support systems to meet U.S. strategic requirements while cooperating with the UK on modernizing its strategic deterrent in accordance with Presidential direction (December 2006).
2. Concept and System Definition for remaining portions of the ship will be accomplished through a Design/Build/Sustain approach modeled after the approach used by the VIRGINIA Class program.
3. Engineering and integration of existing technologies and development of new technologies required to provide the capabilities needed to ensure platform operational effectiveness and minimize life cycle cost.

OR Concept and System Definition Prototyping, and Technology Development Efforts:

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 3220 / *SBSD Advanced Submarine System Development*

The OR program supports design, systems engineering, prototyping and vendor qualification activities needed to develop CMC design, the OHIO Replacement whole ship design, and component development. The OR design timelines are based on the design approach proven on the VIRGINIA Class Program, adjusted for the additional complexity of a missile compartment and Strategic Weapons Systems (SWS). Planned technical studies and prototyping are necessary to reduce risks associated with updating SSBN system designs for current technical standards and demonstrating design feasibility of developmental technology to meet the ship design and construction schedule.

The Navy continues investing in program funded affordability initiatives similar to those employed successfully for VIRGINIA Class, but tailored to the unique SSBN mission and operational tempo of OHIO Replacement to drive down overall program costs. Efforts will focus on reducing ship construction costs through implementing more effective design features to produce a more affordable/producible class. As part of this effort, alternative contracting strategies will be examined to include multi-class multiyear procurement (MYP) and economic order quantity (EOQ).

Activities are being executed to ensure the first article quad pack prototype of the CMC is on schedule to support the UK SUCCESSOR Programme. The CMC program will mature required technologies and re-host the TRIDENT II D5 SWS (Launcher, Fire Control and Navigation) while ensuring no degradation to D5 security, safety and performance. In addition, whole ship design efforts are focused on technologies requiring significant engineering, integration and development time and those technologies that are required to support ship design and construction schedules such as the propulsor, maneuvering/ship control and signatures. These technologies are critical for stealth capability for a ship class that will be in service until the 2080s. Ship concept design efforts include important pre-construction activities such as finalizing ship requirements, risk characterization and mitigation, improvement and validation of performance prediction tools and improvement of design tools. Technology development will address engineering and integration of existing technologies as well as maturation of developmental technologies.
Note: Beginning in 2015, there is an administrative change that will shift efforts funded from PE 0603561N (SBSD Advanced Submarine System Development) / Project 3220 to PE 0603595N (Ohio Replacement) / Project 3220. This shift is consistent with Congressional intent identified in HR 933 (FY13).

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
Title: CMC Design and Prototyping	262.623	-	-	-	-
Articles:	-	-	-	-	-
FY 2014 Accomplishments: Continued efforts for the design and development of the CMC to include: Completion of CMC System Descriptions, completion of 100 percent of CMC engineered components procurement specifications, approximately 70 percent of Diagrams, 20 percent of the Arrangements and 5 percent of Design Disclosures for the CMC according to schedule. Provided ongoing verification and validation efforts for missile tube to quad pack production techniques. Maintained design and prototyping efforts and placed contract actions for LLTM					

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 3220 / *SBSD Advanced Submarine System Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
to support CMC fixture manufacturing to enable proving CMC modular construction efficiencies. Continued system engineering efforts to complete definition of the required CMC testing during the build cycle and finalized planning activities for CMC test facility development. Completed additional competitive development and testing of missile tube to keel robotic welding techniques that support process certification necessary for the Integrated Tube and Hull (ITH) manufacturing technique. Completed validation of multiple vendors for integrated tube and hull manufacturing. Design and System Developments have matured to enable the placement of contract actions for competitive procurement of material to support development of prototype first article missile tubes. Received approvals for CMC Safety Requirements Hazard Analysis (SRHAs). ***FY 2015 Plans:*** N/A ***FY 2016 Base Plans:*** N/A ***FY 2016 OCO Plans:*** N/A					
Title: Ship Study and Design	101.205	-	-	-	-
Articles:	-	-	-	-	-
FY 2014 Accomplishments: Major FY2014 accomplishments include setting Ship length in January 2014 and signing 159 sections of the Ship Specification in March 2014. Continued with preliminary design of forward and aft ends of OHIO Replacement including Rest of Ship system integration, on schedule completion of 38 percent of engineered component procurement specification development, 80 percent of System Diagrams, commencement of Ship Arrangements, and Design Disclosures, and control surface design. Completed non-shipboard prototype design and continued Integrated Product Development Environment (IPDE) design tool process validation. Ensured coordination of the Common Missile Compartment (CMC) interfaces with the Rest of Ship design efforts. ***FY 2015 Plans:*** N/A ***FY 2016 Base Plans:*** N/A ***FY 2016 OCO Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 3220 / *SBSD Advanced Submarine System Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
N/A					
Title: NAVSEA R&D and Prototyping	107.603	-	-	-	-
Articles:	-	-	-	-	-
FY 2014 Accomplishments: Finalized Generation 1 propulsor designs for OHIO Replacement. Finalized requirements for Large Scale Vehicle (LSV) modifications and commenced fabrication of Generation 1 Propulsor LSV test asset hardware. Initialized full scale bearing test rig evaluation using VIRGINIA Class (VCS) sized components. Continued control surface design. Conducted full scale low voltage anode simulations to support developing the cathodic protection system preliminary design. Began Phase I of the Concept of Operations Experiment (COOPEX) to support Hovering and Missile Compensation Control System (HMCCS) and Ship Control System (SCS) Designs. Equipped surrogate full scale test platform to support stern design. Continued development of approximately 50 engineered components and supported ship requirements refinement. Continued development and delivery of preliminary GFI for Non-Propulsion Electronics Systems (NPES) needed to support Rest of Ship design development. ***FY 2015 Plans:*** N/A ***FY 2016 Base Plans:*** N/A ***FY 2016 OCO Plans:*** N/A					
Title: Strategic Weapons Systems Integration	171.433	-	-	-	-
Articles:	-	-	-	-	-
FY 2014 Accomplishments: Continued system engineering efforts required for the re-hosting and integration of the TRIDENT II (D5) SWS on the OHIO Replacement submarine; including review and modification of SWS Coordination, Interface and Arrangement Drawings for SWS equipment within the CMC and MCCM, SWS system and subsystem preliminary design, and Hardware and Software requirements development. Continued SWS Test Systems material procurement and builds, test berth / facility modifications and development of special test vehicles. Continued development of SWS Ashore test capability and SWS training capability / requirements. Commence build of Fire Control Engineering Test Systems. Continued design efforts for the development of a missile launch					

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy			Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 3220 / *SBSD Advanced Submarine System Development*	

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
tube test capability and test stand including refurbishment of a test vehicle to support launch system prototype efforts and evaluation / qualification program. Initiated design and development efforts for shipboard SWS Navigation. Initiated systems engineering design efforts related to the OHIO Replacement guidance handling carts. Material procurement for underwater launch risk mitigation testing. ***FY 2015 Plans:*** N/A ***FY 2016 Base Plans:*** N/A ***FY 2016 OCO Plans:*** N/A					
Title: Systems Engineering/Program Management	67.270	-	-	-	-
Articles:	-	-	-	-	-
FY 2014 Accomplishments: Continued to provide technical and programmatic oversight including Program Office management and technical support from government laboratories for review, analysis and approval of lead design yard and various government performer's design deliverables. Continued maintenance planning and design for sustainment activities. Updated the Ohio Replacement Capabilities Development Document (CDD) and its derivative documents in preparation for submission to and approval by the Joint Requirements Oversight Counsel (JROC). Continued the functional allocation of platform level requirements as informed by the CDD to ship systems and components to support the maturation of the ship's design documents. Identification and assessment of platform, shore facilities, and infrastructure characteristics to identify improvement opportunities to positively impact program costs. ***FY 2015 Plans:*** N/A ***FY 2016 Base Plans:*** N/A ***FY 2016 OCO Plans:*** N/A					
Title: Design for Affordability	50.000	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 3220 / *SBSD Advanced Submarine System Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
Articles:	-	-	-	-	-
FY 2014 Accomplishments: Continued execution of the DFA program including design yard cost reduction initiatives in order to drive down overall program costs across design, construction and Operations and Support (O&S). The Lead Design Yard has met the R&D Design Contract affordability incentives ahead of schedule for Non-Recurring Engineering, Recurring Construction, and Operations and Support (O&S) cost reductions ahead of schedule. Through May 2014, the OHIO Replacement shipbuilder NRE costs have been reduced by over $800M (Then Year (TY) Dollars) on a schedule to meet NRE cost targets. Additionally, efforts have resulted in a 12-ship class cost reduction of over $500M (Constant Year (CY) 2010 Dollars) in construction and over $130M (CY 2010 Dollars) in operating and support (O&S). Achieving these cost reductions in the design phase of the program does not result in a near term budget reduction as the current budget is constrained to aggressive should cost targets. Rather, the program continues to invest in successful cost reduction initiatives to reduce long term budget requirements. Specific initiatives include robotic welding, Integrated Product Development Environment (IPDE) process development, and material reuse. Continued program affordability incentive efforts are targeted to achieving potential savings associated with multi-year and/or Economic Order Quantity (EOQ) procurements across submarine classes, investigating the government vs. contractor furnished equipment mix for potential efficiencies, and potential savings associated with continuous missile tube and/or launch tube production runs. Affordability efforts continue to be inherent in the entire OHIO Replacement design. ***FY 2015 Plans:*** N/A ***FY 2016 Base Plans:*** N/A ***FY 2016 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	760.134	-	-	-	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• RDTEN/3219: *SBSD Nuclear Technology Development*	296.050	369.964	422.661	-	422.661	411.598	401.698	291.302	278.600	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 3220 / *SBSD Advanced Submarine System Development*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• RDTEN/3220: *(U) OHIO Replacement*	-	812.807	977.034	-	977.034	718.185	771.442	488.712	209.178	Continuing	Continuing
• SCN/1045: *OHIO Replacement Submarine*	-	-	-	-	-	777.793	791.793	2,771.344	1,316.280	Continuing	Continuing
• RDTEN/3237: *ORP Launch Test Facility*	-	36.470	-	-	-	-	-	-	-	-	36.470

Remarks

D. Acquisition Strategy

The common missile compartment will be designed and developed to support the U.S. and UK in development of the OHIO Replacement and SUCCESSOR SSBN programs enabling a common U.S.-UK CMC and maximizing the benefit of the ongoing U.S.-UK partnership in strategic deterrence. The OHIO Replacement R&D efforts will incentivize cost reduction initiatives in the design, construction and operations & support portions of the program. R&D efforts will be performed by Navy laboratories, shipyards, private industry, and University Affiliated Research Centers.

E. Performance Metrics

Updated Integrated Master Schedule and CMC build strategy down-select. Development of signature management efforts to address knowledge gap, concepts for propulsor and shafting, and design guidance and interface control requirements.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2016 Navy			Date: February 2015
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / *Advanced Submarine System Development*	Project (Number/Name) 3220 / *SBSD Advanced Submarine System Development*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	SS/CPFF	Ship Design Contractor-EB : Groton, CT	1,118.555	458.977	Dec 2013	-		-		-		-	-	1,577.532	-
Product Development	WR	NSWC : Carderock, MD	230.394	64.751	Dec 2013	-		-		-		-	-	295.145	-
Product Development	SS/CPFF	ARL Penn State University : State College, PA	3.575	0.370	Dec 2013	-		-		-		-	-	3.945	-
Product Development	SS/CPFF	NGMS : Sunnyvale, CA	109.253	40.056	Dec 2013	-		-		-		-	-	149.309	-
Product Development	WR	NUWC : Newport, RI	47.363	25.943	Dec 2013	-		-		-		-	-	73.306	-
Product Development	SS/CPFF	JHU/APL : Laurel, MD	19.451	5.787	Dec 2013	-		-		-		-	-	25.238	-
Product Development	SS/CPFF	Draper Labs : Cambridge, MA	8.197	3.365	Dec 2013	-		-		-		-	-	11.562	-
Product Development	SS/CPFF	LMFS : Mitchel Field, NY	22.464	12.607	Dec 2013	-		-		-		-	-	35.071	-
Product Development	Various	NSWC : Corona, CA	0.000	0.224	Dec 2013	-		-		-		-	-	0.224	-
Product Development	Various	NAVSEA : Various	46.508	17.969	Dec 2013	-		-		-		-	-	64.477	-
Product Development	Various	EMCUBE : Alexandria, VA	0.000	0.667	Dec 2013	-		-		-		-	-	0.667	-
Product Development	Various	JRC : Washington, DC	0.000	0.928	Dec 2013	-		-		-		-	-	0.928	-
Product Development	WR	NOTU : Port Canaveral, FL	4.400	-	Dec 2013	-		-		-		-	-	4.400	-
Product Development	SS/CPFF	LMMSC : Sunnyvale, CA	73.454	30.866	Dec 2013	-		-		-		-	-	104.320	-
Product Development	C/CPFF	GDAIS : Pittsfield, MA	82.006	33.556	Dec 2013	-		-		-		-	-	115.562	-
Product Development	SS/CPFF	IEC : Anaheim, CA	7.555	1.056	Dec 2013	-		-		-		-	-	8.611	-
Product Development	WR	NSWC : Dahlgren, VA	9.927	6.575	Dec 2013	-		-		-		-	-	16.502	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 3220 / *SBSD Advanced Submarine System Development*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	SS/CPFF	BAE : Rockville, MD	31.844	7.837	Dec 2013	-		-		-		-	-	39.681	-
Product Development	SS/CPFF	BNA : Huntington Beach, CA	7.698	1.453	Dec 2013	-		-		-		-	-	9.151	-
Product Development	WR	NSWC Crane : Crane, IN	23.069	13.317	Dec 2013	-		-		-		-	-	36.386	-
Product Development	WR	NWC CL : China Lake, CA	25.109	6.593	Dec 2013	-		-		-		-	-	31.702	-
Product Development	SS/CPFF	SPA : Alexandria, VA	9.774	3.402	Dec 2013	-		-		-		-	-	13.176	-
Product Development	Various	SSP : Various	24.857	2.774	Dec 2013	-		-		-		-	-	27.631	-
		Subtotal	1,905.453	739.073		-		-		-		-	-	2,644.526	-

Remarks

Note: Various is used for multiple activities with different award dates

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Test and Evaluation Support	C/CPFF	T&E Support : Various	1.155	-		-		-		-		-	-	1.155	-
Government Test and Evaluation Support	WR	T&E Support : Various	6.751	-		-		-		-		-	-	6.751	-
		Subtotal	7.906	-		-		-		-		-	-	7.906	-

Remarks

Note: Various is used for multiple activities with different award dates. Contractor Test & Evaluation Support cost category item funds will be sent to Shipbuilder and Support Contractors to be determined. Government Test and Evaluation Support cost category item funds will be sent to several Navy activities to be determined.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 3220 / *SBSD Advanced Submarine System Development*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Management Support	C/CPFF	Various : Multiple Awards	35.391	9.391	Nov 2013	-		-		-		-	-	44.782	-
Government Management Support	WR	Various : NSWC Carderock, MD	37.091	11.170	Nov 2013	-		-		-		-	-	48.261	-
Travel	WR	NAVSEA HQ : Washington, D.C.	1.352	0.500	Dec 2013	-		-		-		-	-	1.852	-
		Subtotal	73.834	21.061		-		-		-		-	-	94.895	-

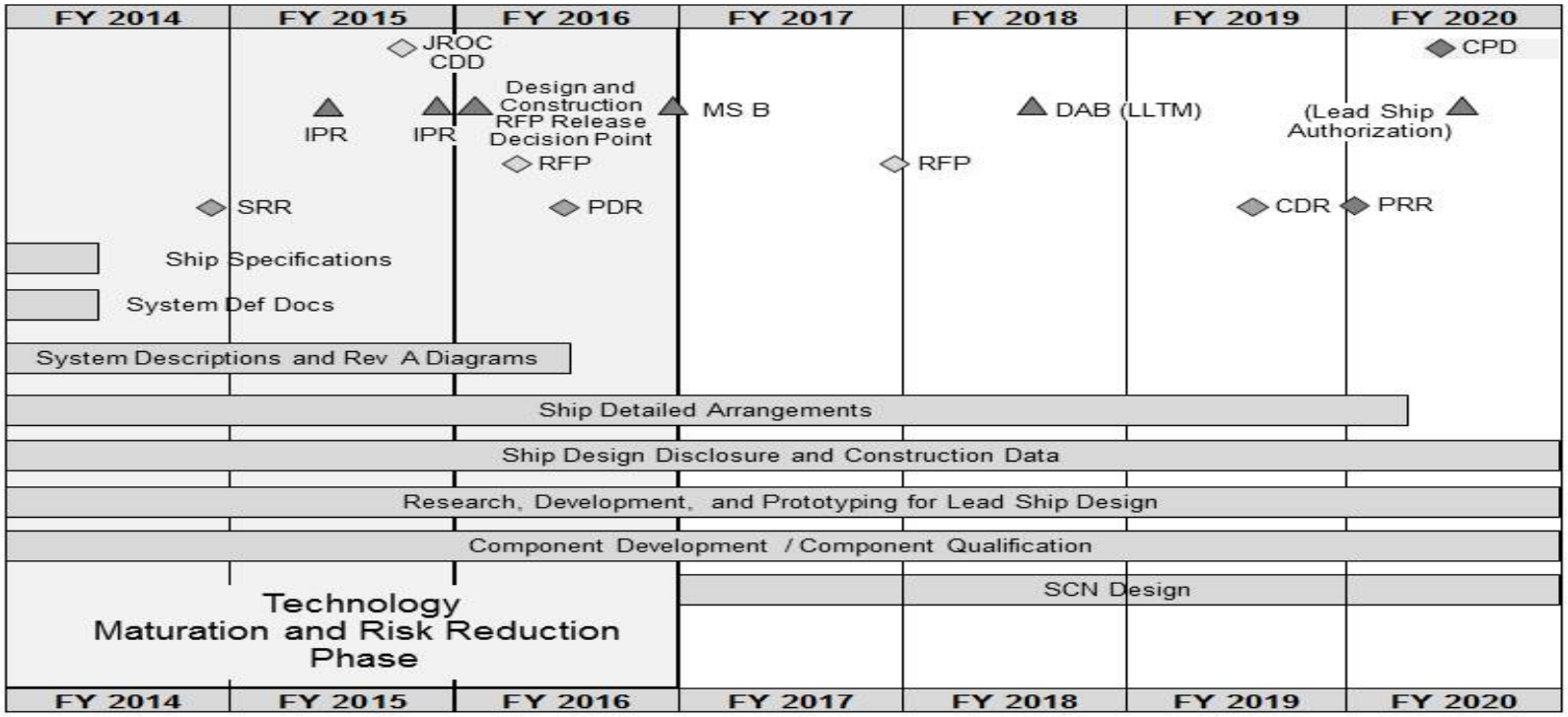
Remarks

Note: Various is used for multiple activities with different award dates

	Prior Years	FY 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	1,987.193	760.134		-		-		-		-	-	2,747.327	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 3220 / *SBSD Advanced Submarine System Development*



CDD - Capabilities Development Document
CDR - Critical Design Review
CPD - Capability Production Document
DAB - Defense Acquisition Board
IPR - In Progress Review
JROC - Joint Requirements Oversight Council
LLTM - Long Lead Time Material
MS - Milestone
PDR - Preliminary Design Review
PRR – Production Readiness Review
RDT&E - Research, Development, Test, & Evaluation
RFP - Request for Proposal
SCN - Shipbuilding and Conversion, Navy
SRR - System Requirements Review

Exhibit R-4A, RDT&E Schedule Details: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 3220 / *SBSD Advanced Submarine System Development*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Notes: * Effort began prior to 1st Quarter FY 2014. ** Effort continues past 4th Quarter FY 2020.				
Ship Specifications*	1	2014	2	2014
System Definition Documents*	1	2014	2	2014
System Descriptions and REV A Diagrams*	1	2014	2	2016
Ship Detailed Arrangements*	1	2014	1	2020
Ship Design Disclosure and Construction Data*	1	2014	4	2020
Research Development and Prototyping for Lead Ship*,**	1	2014	4	2020
Component Development/Component Qualification*,**	1	2014	4	2020
SCN Design**	1	2017	4	2020