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 0603562N *I Submarine Tactical Warfare Sys*							
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	53.946	8.675	8.044	10.371	-	10.371	9.958	10.270	9.550	11.578	Continuing	Continuing
0770: *Adv Sub Supp Equip Prog*	13.054	3.807	3.343	4.103	-	4.103	4.052	4.161	4.415	4.733	Continuing	Continuing
1739: *Submarine Arctic W/F Development*	40.892	4.868	4.701	6.268	-	6.268	5.906	6.109	5.135	6.845	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Submarine Tactical Warfare Systems program element is comprised of the Advanced Submarine Support Equipment Program (ASSEP) and the Submarine Special Operations Support Program. The objective is to improve submarine operational effectiveness through the development and implementation of advanced Research and Development (R&D). In order to provide improved operational effectiveness, R&D efforts are focused on Advanced Imaging Developments and Advanced Electronic Warfare Support (ES) Developments. A continuing need exists to improve these capabilities in view of the advancements in potential imaging counter detection, the need to support specialized missions, and the increasingly dense and sophisticated electronic environment caused by the proliferation of complex radar, communications, and navigation equipment of potential adversaries. Ongoing developments in 360 degree imaging systems and electro-optic infra-red vulnerability signature reduction technologies are supporting these needs.

The Submarine Arctic Warfare Development program responds to the increased threat of naval activity in the Arctic regions while continuously supporting the Navy's strategic objective of Assured Access and Combat Credibility. The U.S. Navy Submarine Force (SUBFOR) demonstrates existing Arctic Warfare capabilities, operational and tactical proficiency while developing advanced submarine research and development technology in unique cold water environments, under-ice conditions, and ice-covered shallow water regions during Ice Exercises (ICEX). ICEXs are conducted biannually and require up front comprehensive planning and work-up training, as well as post exercise analysis and reporting. ICEX provides the framework for various submarine research and development programs to conduct test and evaluation in Arctic regions or at periodic Ice Camps. Particular emphasis is placed on the areas of sonar operability, tactical surveillance, weapon utility, and other submarine support missions. Efforts include assessment of combat system effectiveness, development of Arctic specific improvements for existing sonar and weapons, development of class specific Arctic operational guidelines, and the testing of ice-capable submarine support structures. This program also provides SUBFOR a cadre of trained Arctic Operation Specialists (AOS) and an inventory of unique Arctic sensors to optimize submarine safety during under-ice operations.

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 0603562N *I Submarine Tactical Warfare Sys*		
B. Program Change Summary ($ in Millions)	**FY 2014**	**FY 2015**	**FY 2016 Base**	**FY 2016 OCO**	**FY 2016 Total**
Previous President's Budget	8.764	8.044	8.896	-	8.896
Current President's Budget	8.675	8.044	10.371	-	10.371
Total Adjustments	-0.089	-	1.475	-	1.475
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.089	-			
• Program Adjustments	-	-	1.531	-	1.531
• Rate/Misc Adjustments	-	-	-0.056	-	-0.056

Change Summary Explanation

Cost/Funding:

Project 1739: FY 2016 funding was added ($+1.500M) under 'Program Adjustments' to reflect the rephasing of Submarine Arctic Warfare Development program Ice Exercises (ICEXs) and Ice Camps from being conducted every three (3) years to every two (2) years in accordance with Department requirements.

Schedule: Not applicable.

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 0603562N / *Submarine Tactical Warfare Sys*	Project (Number/Name) 0770 / *Adv Sub Supp Equip Prog*	

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
0770: *Adv Sub Supp Equip Prog*	13.054	3.807	3.343	4.103	-	4.103	4.052	4.161	4.415	4.733	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

A continuing need exists to improve Imaging and Electronic Warfare support (EW) capabilities in view of the advancements in potential imaging counter detection and the increasingly dense electromagnetic environment caused by the proliferation of complex radar, communications, and navigation equipment of potential adversaries. Improvements are necessary for submarine EW and Imaging to be operationally effective in the following mission areas: Joint Littoral Warfare, Joint Surveillance, Space and Electronic Warfare, Intelligence Collection, Maritime Protection, and Joint Strike. The program is divided into two project categories: Advanced Imaging Project Development and Advanced Electronic Warfare Support Project Development. Both of these categories will allow for the mitigation of submarine masts, periscopes, and sensors to visual, radar, and infrared detection. Evaluation of state of the art technology to implement periscope/mast improvements via EW electromagnetic and electro-optic sensors results in improved capability. Engineering Demonstration Models (EDMs) are developed, evaluated, and validated in the lab and through at-sea testing.

The Advanced Imaging Project Development projects include the development of the Affordable Modular Panoramic Photonics Mast (AMPPM) which introduces several groundbreaking technologies such as individually replaceable capability modules (allowing a vast array of capability combinations without requiring redesign) as well as presenting live 360 degree High Definition video (greatly increasing situational awareness and reducing scope exposure time.) Also in support of the Advance Imaging Project Development are; Electro-Optic/Infrared (EO/IR) Vulnerability Signature Reduction, Automatic Aircraft Cueing, RF Vulnerability Reduction (RAS), Mast Test Vehicle (MTV) testing, Imaging Engineering Measurement Program, and a Project Arrangement (PA) with Australia covering Electromagnetic Spectrum Sensor System Simulation & Development for model-based mission planning and a Coalition Warfare Program (CWP) covering periscope vulnerability. The Advanced EW Development projects include the development of: Radar Vulnerability Tool, Enhanced DeInterleavers, Electronic Support (ES) Correlator, Low Probability of Intercept (LPI) Direction Finding (DF), High Speed Network, Embedded Built-in Test (BIT), EW on-Board Trainer (OBT), Multi-function Modular Mast (MMM) Payloads and Next Generation EW Systems Algorithms and Applications. OPNAV direction provided for Next Generation EW in reference dated 17 June 12, SER N97/12U144401.

All programs funded in this project are non-Acquisition Category (ACAT) programs. The test articles identified consist of critical components that will be fully developed during Engineering Manufacturing and Development phase into EDMs.

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 Imaging Project Development	2.038	2.047	2.280	-	2.280
Articles:	-	-	-	-	-
FY 2014 Accomplishments: LPPM Lab Test/Sell Off					

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 0603562N / *Submarine Tactical Warfare Sys*	**Project (Number/Name)** 0770 / *Adv Sub Supp Equip Prog*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
360 Degree Imaging (ONR) Development, AMPPM - Lab Testing SWIR and Hyperspectral Universal Mast Controller S/W & H/W Development/Test, EDM# 3 Delivery Electro-Optic/Infrared Vulnerability Signature Reduction Development / At-Sea Test Radio Frequency over Fiber (RFoF) Lab Testing Covert Electronic Support Measures (ESM) FDR Automatic Aircraft Cueing Development ***FY 2015 Plans:*** 360 Imaging (ONR) - AMPPM - FNC Lab Demo 360 Imaging (ONR) - AMPPM - FNC Pierside Testing Low Profile Photonics Mast At-sea Test RFoF Lab Demo At Sea Test Covert ESM Lab Testing Covert ESM At Sea Test Automatic Aircraft Cueing Continued Development GPS Denied Navigation Development Submarine METOC Development PA Electromagnetic Spectrum Sensor System Simulation - Development CWP Periscope Vulnerability - Development ***FY 2016 Base Plans:*** RF Vulnerability Reduction (RAS) - Lab Test Automatic Aircraft Cueing - Lab Test GPS Denied Navigation Continued Development Submarine METOC Continued Development CWP Periscope Vulnerability - Lab Test ***FY 2016 OCO Plans:*** N/A					
Title: Advanced Electronic Warfare Support (EW) Project Development	1.769	1.296	1.823	-	1.823
Articles:	-	-	-	-	-
FY 2014 Accomplishments: Electronic Support (ES) Vulnerability Tool / Tactical Decision Aid Lab Demo Enhanced DeInterleavers SBIR Lab Demo/Development					

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 0603562N / *Submarine Tactical Warfare Sys*	**Project (Number/Name)** 0770 / *Adv Sub Supp Equip Prog*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
LPI DF / Localization Development Embedded Built-in Test (BIT) Development/Lab Demo ES Server (Valkyrie) Development					
FY 2015 Plans: ES Vulnerability Tool / Tactical Decision Aid Lab Demo/Transition to EW ES Server (Valkyrie) Lab Demo / Transition to EW Enhanced DeInterleavers Lab Demo #1 LPI DF / Localization Continued Development Embedded Built-in Test (BIT) Transition to EW Submarine EW Digital DF Development Hunan Machine Interface (HMI) Development					
FY 2016 Base Plans: Enhanced DeInterleavers Lab Demo #2 LPI DF / Localization Lab Test MMM Payload Coherent Electronic Attack for Submarines (CEAS) Development High Speed Network Development / Lab Testing Submarine EW Digital DF Continued Development Hunan Machine Interface (HMI) Continued Development					
FY 2016 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	3.807	3.343	4.103	-	4.103

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

This project optimizes technology insertion using a build-test-build approach to support EW and Imaging operational needs. Operational needs have been based on the tactical requirements identified in CNO letters, Serial N77/3U629212, dated 04 Sep 03, CNO ltr Ser N772/5U936037 dtd 13 JUN 2005, CNO ltr Ser N776/4U786103 dtd 1 APR 2004, COMSUBLANT/ COMSUBPAC, Virginia Class SSN Operational Requirements Documentation objectives, ORD for Photonics (ORD #365-87-94) [dtd JUL 1994], Operational Requirements Document (ORD) for ES (ORD # 570-77-00) [dtd 20 DEC 2000], ORD for ISIS (ORD #663-77-05) [dtd MAR 2005], Capability

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 0603562N / *Submarine Tactical Warfare Sys*	**Project (Number/Name)** 0770 / *Adv Sub Supp Equip Prog*

Development Document (CDD) for Submarine EW Systems (Ver-DRAFT), Common Submarine Imaging System (CSIS) (CDD# 849-87-11) dtd 22 Dec 2011 for Submarine Imaging Systems and JOINT COMMAND SUBMARINE FORCE/COMMANDER SUBMARINE FORCE ltr Ser# N00/00621 dtd 24 Oct 2011. Project efforts develop submarine unique improvements to mast, periscope, and EW electromagnetic spectrum and electro-optic sensors based on emerging technologies that are available from DoD Exploratory Development Programs, industry Independent Research and Development, and other sources. Engineering Demonstration Models (EDMs) will be developed to provide a realistic method of evaluating the improvements, including deployment on submarines for testing.

E. Performance Metrics

The RDD program goal is to respond to urgent operational needs within 30 days and provide for rapid development and fielding of prototype solutions within 270 days.

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 0603562N / *Submarine Tactical Warfare Sys*	**Project (Number/Name)** 0770 / *Adv Sub Supp Equip Prog*

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
Systems Engineering	WR	NUWC : RI	9.696	2.213	Nov 2013	2.266	Oct 2014	3.318	Oct 2015	-		3.318	Continuing	Continuing	Continuing
Systems Engineering	SS/FFP	JHU/ARL : MD	0.918	0.178	Jul 2014	-	Dec 2014	0.183	Jul 2016	-		0.183	Continuing	Continuing	Continuing
Primary Hardware Development	WR	NSWC Philadelphia : PA	0.367	0.263	Mar 2014	-	Nov 2014	-	Nov 2015	-		-	-	0.630	-
Primary Hardware Development	C/CPFF	3 Phoenix : VA	1.641	0.188	Apr 2014	0.289	Dec 2014	-		-		-	-	2.118	-
Primary Software Deveopment	WR	SSC PAC : CA	0.000	0.310	May 2014	0.410	Oct 2014	0.421	Oct 2015	-		0.421	-	1.141	-
Primary Software Development	C/CPFF	Reserach Associates of Syracuse : NY	0.000	0.173	Sep 2014	0.032	Dec 2014	-		-		-	-	0.205	-
Primary Hardware Development	C/CPFF	Northrop Grumman : VA	0.000	0.186	Apr 2014	0.318	Dec 2014	-		-		-	-	0.504	-
Primary Hardware Development	C/CPFF	SEACORP : RI	0.000	0.267	Sep 2014	-		-		-		-	-	0.267	-
Primary Software and Hardware Development	C/CPFF	Accipiter : PA	0.000	-		-		0.153	Mar 2016	-		0.153	-	0.153	-
		Subtotal	12.622	3.778		3.315		4.075		-		4.075	-	-	-

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
Engineering Technical Services	C/CPAF	Booz Allen & Hamilton : McLean, VA	0.216	-	Feb 2014	-	Feb 2015	-		-		-	Continuing	Continuing	Continuing
		Subtotal	0.216	-		-		-		-		-	-	-	-

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 0603562N / *Submarine Tactical Warfare Sys*	**Project (Number/Name)** 0770 / *Adv Sub Supp Equip Prog*

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
Travel	WR	NAVSEA : WNY	0.216	0.029	Oct 2013	0.028	Oct 2014	0.028	Oct 2015	-		0.028	Continuing	Continuing	Continuing
		Subtotal	0.216	0.029		0.028		0.028		-		0.028	-	-	-

	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	13.054	3.807		3.343		4.103		-		4.103	-	-	-

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 0603562N / *Submarine Tactical Warfare Sys*	**Project (Number/Name)** 0770 / *Adv Sub Supp Equip Prog*

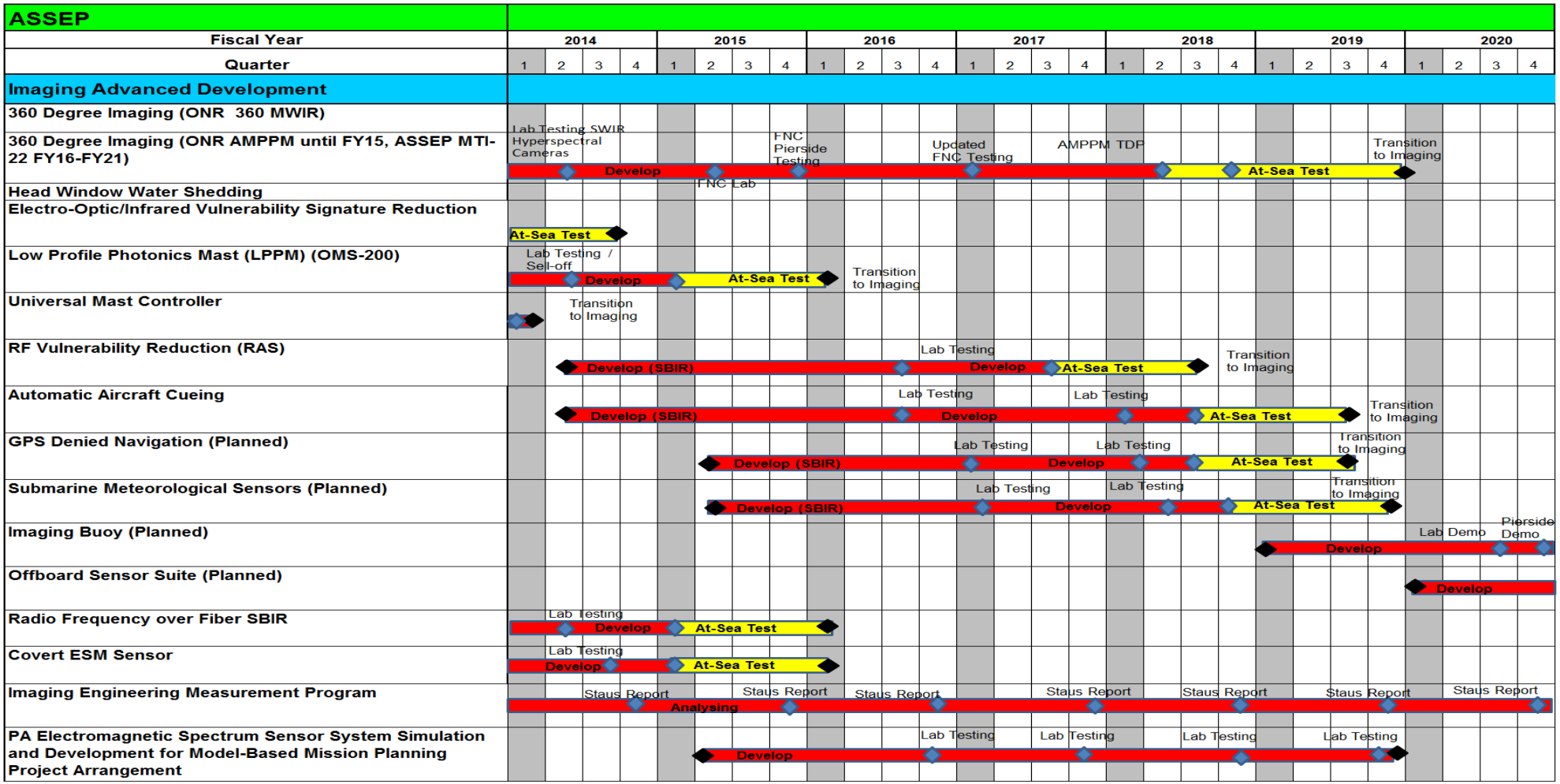

Exhibit R-4, RDT&E Schedule Profile: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603562N / *Submarine Tactical Warfare Sys*	**Project (Number/Name)** 0770 / *Adv Sub Supp Equip Prog*

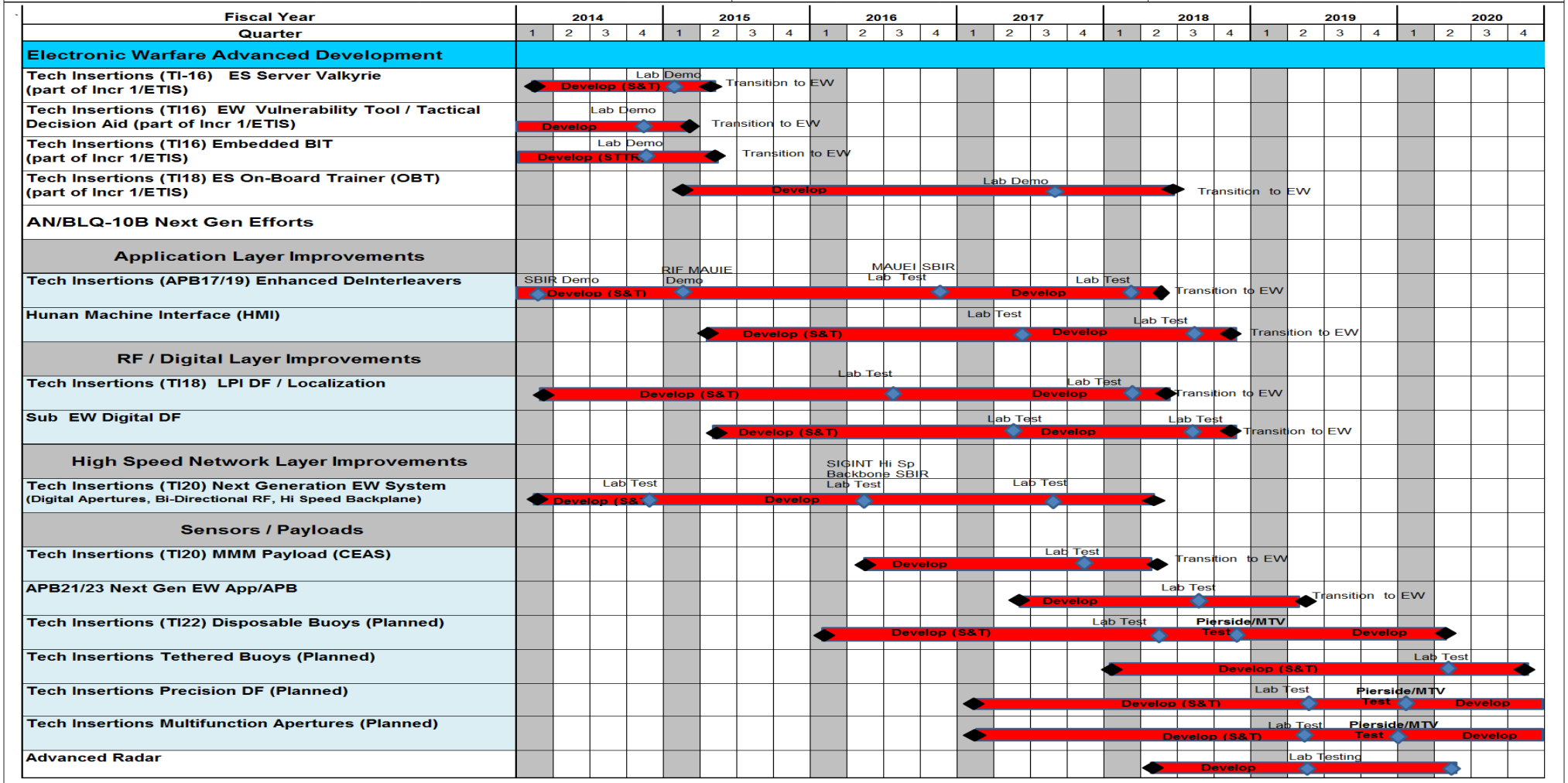

Exhibit R-4A, RDT&E Schedule Details: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603562N / *Submarine Tactical Warfare Sys*	**Project (Number/Name)** 0770 / *Adv Sub Supp Equip Prog*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 0770				
Imaging Advanced Development: 360 Degree Imaging (ONR)	1	2014	2	2018
Imaging Advanced Development: 360 Degree Imaging (ONR) - AMPPM - Lab Testing SWIR	2	2014	2	2014
Imaging Advanced Development: 360 Degree Imaging (ONR) - AMPPM - Hyperspectral Lab Test	2	2014	2	2014
Imaging Advanced Development: 360 Degree Imaging (ONR) - AMPPM - FNC Lab Demo	2	2015	2	2015
Imaging Advanced Development: 360 Degree Imaging (ONR) - AMPPM - FNCPierside Testing	4	2015	4	2015
Imaging Advanced Development: 360 Degree Imaging (ONR) - AMPPM - Updated FNC Testing	1	2017	1	2017
Imaging Advanced Development: 360 Degree Imaging (ONR) - AMPPM - AMPPM TDP	2	2018	2	2018
Imaging Advanced Development: 360 Degree Imaging (ONR) - AMPPM - At-Sea Test	2	2018	4	2019
Imaging Advanced Development: 360 Degree Imaging (ONR) - AMPPM - Transition to Imaging	4	2019	4	2019
Imaging Advanced Development: EO/IR Vulnerability Signature Reduction - At-Sea Test	1	2014	3	2014
Imaging Advanced Development: Low Profile Photonics Mast - Development	1	2014	1	2015
Imaging Advanced Development: Low Profile Photonics Mast - Lab Testing/Sell-off	4	2014	4	2014
Imaging Advanced Development: Low Profile Photonics Mast - At-Sea Test	1	2015	1	2016
Imaging Advanced Development: Low Profile Photonics Mast - Transition to Imaging	1	2016	1	2016
Imaging Advanced Development: UMC #3 Delivery	1	2014	1	2014

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 0603562N / *Submarine Tactical Warfare Sys*	**Project (Number/Name)** 0770 / *Adv Sub Supp Equip Prog*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Imaging Advanced Development: UMC Transition to Imaging	1	2014	1	2014
Imaging Advanced Development: RF Vulnerability Reduction (RAS) Development	2	2014	3	2017
Imaging Advanced Development: RF Vulnerability Reduction (RAS) Lab Testing	3	2016	3	2016
Imaging Advanced Development: RF Vulnerability Reduction (RAS) At-Sea Test	3	2017	3	2018
Imaging Advanced Development: RF Vulnerability Reduction (RAS) Transition to Imaging	3	2018	3	2018
Imaging Advanced Development: Automatic Aircraft Cueing - Develop	2	2014	3	2018
Imaging Advanced Development: Automatic Aircraft Cueing - Lab Testing	3	2016	3	2016
Imaging Advanced Development: Automatic Aircraft Cueing - Lab Testing #2	1	2018	1	2018
Imaging Advanced Development: Automatic Aircraft Cueing - At-Sea Test	3	2018	3	2019
Imaging Advanced Development: Automatic Aircraft Cueing - Transition to Imaging	3	2019	3	2019
Imaging Advanced Development: GPS Denied Navigation - Develop	2	2015	3	2018
Imaging Advanced Development: GPS Denied Navigation - Lab Testing	1	2017	1	2017
Imaging Advanced Development: GPS Denied Navigation - Lab Testing #2	1	2018	1	2018
Imaging Advanced Development: GPS Denied Navigation - At-Sea Test	3	2018	3	2018
Imaging Advanced Development: GPS Denied Navigation - Transition to Imaging	3	2018	3	2018
Imaging Advanced Development: Submarine Meteorological Sensors - Develop	2	2015	4	2019
Imaging Advanced Development: Submarine Meteorological Sensors - Lab Testing	1	2017	1	2017
Imaging Advanced Development: Submarine Meteorological Sensors - Lab Testing #2	2	2017	2	2017
Imaging Advanced Development: Submarine Meteorological Sensors - At-Sea Test	4	2019	4	2020
Imaging Advanced Development: Submarine Meteorological Sensors - Transition to Imaging	4	2020	4	2020
Imaging Advanced Development: Imaging Buoy (Planned) - Develop	1	2019	4	2019
Imaging Advanced Development: Imaging Buoy (Planned) - Lab Demo	3	2020	3	2020
Imaging Advanced Development: Imaging Buoy (Planned) - Pierside Demo	4	2020	4	2020
Imaging Advanced Development: Offboard Sensor Suite (Planned) - Develop	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 0603562N / *Submarine Tactical Warfare Sys*	**Project (Number/Name)** 0770 / *Adv Sub Supp Equip Prog*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Imaging Advanced Development: RF over Fiber Lab Test	4	2014	4	2014
Imaging Advanced Development: RF over Fiber At-Sea Test	1	2015	1	2016
Imaging Advanced Development: Covert ESM FDR	4	2014	4	2014
Imaging Advanced Development: Covert ESM Lab Test	1	2015	1	2015
Imaging Advanced Development: Covert ESM (At-Sea-Test)	1	2015	1	2016
Imaging Advanced Development: Imaging Engineering Measurement Program Analysis	1	2014	4	2020
Imaging Advanced Development: Imaging Engineering Measurement Program - Status Report #1	4	2014	4	2014
Imaging Advanced Development: Imaging Engineering Measurement Program - Status Report #2	4	2015	4	2015
Imaging Advanced Development: Imaging Engineering Measurement Program - Status Report #3	4	2016	4	2016
Imaging Advanced Development: Imaging Engineering Measurement Program - Status Report #4	4	2017	4	2017
Imaging Advanced Development: Imaging Engineering Measurement Program - Status Report #5	4	2018	4	2018
Imaging Advanced Development: Imaging Engineering Measurement Program - Status Report #6	4	2019	4	2019
Imaging Advanced Development: Imaging Engineering Measurement Program - Status Report #7	4	2020	4	2020
Imaging Advanced Development: PA Electromagnetic Spectrum Sensor System Simulation & Development for Model-Based Mission Planning Project Arrangment and CWP Periscope Vulnerability- Develop	2	2015	2	2015
Imaging Advanced Development: CWP Periscope Vulnerability - Test	4	2016	4	2016
Imaging Advanced Development: PA Electromagnetic Spectrum Sensor System Simulation and Development for Model-Based Mission Planning Project Arrangment - Lab Test #1	4	2017	4	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 0603562N / *Submarine Tactical Warfare Sys*	**Project (Number/Name)** 0770 / *Adv Sub Supp Equip Prog*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Imaging Advanced Development: PA Electromagnetic Spectrum Sensor System Simulation and Development for Model-Based Mission Planning Project Arrangment - Lab Test #2	4	2018	4	2018
Imaging Advanced Development: PA Electromagnetic Spectrum Sensor System Simulation and Development for Model-Based Mission Planning Project Arrangment - Lab Test #3	4	2019	4	2019
Electronic Warfare Advance Development: TI-16 ES Server Valkyrie - Develop	1	2014	2	2015
Electronic Warfare Advance Development: TI-16 ES Server Valkyrie - Lab Demo	1	2015	1	2015
Electronic Warfare Advance Development: TI-16 ES Server Valkyrie - Transition to EW	2	2015	2	2015
Electronic Warfare Advance Development: TI-16 Radar Vulnerability Tool/Tactical Decision Aid - Lab Demo #1	4	2014	4	2014
Electronic Warfare Advance Development: TI-16 Radar Vulnerability Tool/Tactical Decision Aid - Transition to EW	1	2015	1	2015
Electronic Warfare Advance Development: TI-16 Embedded BIT - Develop	1	2014	2	2015
Electronic Warfare Advance Development: TI-16 Embedded BIT - Lab Demo	4	2014	4	2014
Electronic Warfare Advance Development: TI-16 Embedded BIT - Transition to EW	2	2015	2	2015
Electronic Warfare Advance Development: TI-18 ES On-Board Trainer - Develop	1	2015	2	2018
Electronic Warfare Advance Development: TI-18 ES On-Board Trainer - Lab Demo	3	2017	3	2017
Electronic Warfare Advance Development: TI-18 ES On-Board Trainer - Transition to EW	2	2018	2	2018
Electronic Warfare Advance Development: Technical Insertions (APB/17/19) Enhanced DeInterleavers Develop	1	2014	2	2018
Electronic Warfare Advance Development: Technical Insertions (APB/17/19) Enhanced DeInterleavers SBIR Demo	1	2014	1	2014
Electronic Warfare Advance Development: Technical Insertions (APB/17/19) Enhanced DeInterleavers RIF MAUEI Demo	1	2015	1	2015
Electronic Warfare Advance Development: Technical Insertions (APB/17/19) Enhanced DeInterleavers Lab Test	4	2016	4	2016

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 0603562N / *Submarine Tactical Warfare Sys*	**Project (Number/Name)** 0770 / *Adv Sub Supp Equip Prog*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Electronic Warfare Advance Development: Technical Insertions (APB/17/19) Enhanced DeInterleavers Lab Test #2	1	2018	1	2018
Electronic Warfare Advance Development: Technical Insertions (APB/17/19) Enhanced DeInterleavers Transition to EW	2	2018	2	2018
Electronic Warfare Advance Development: Technical Insertions (TI-18) LPI DF / Localization - Develop	1	2014	2	2018
Electronic Warfare Advance Development: Technical Insertions (TI-18) LPI DF / Localization - Lab Test	3	2016	3	2016
Electronic Warfare Advance Development: Technical Insertions (TI-18) LPI DF / Localization - Lab Test #2	1	2018	1	2018
Electronic Warfare Advance Development: Technical Insertions (TI-18) LPI DF / Localization - Transition to EW	2	2018	2	2018
Electronic Warfare Advance Development: TI-20 Next Generation EW System-Development	1	2014	4	2016
Electronic Warfare Advance Development: TI-20 Next Generation EW System- Lab Test	4	2014	4	2014
Electronic Warfare Advance Development: TI-20 Next Generation EW System - High Speed Network Development	2	2014	2	2018
Electronic Warfare Advance Development: TI-20 Next Generation EW System - High Speed Network Lab Test	2	2016	2	2016
Electronic Warfare Advance Development: TI-20 Next Generation EW System - Transition to EW	2	2018	2	2018
Electronic Warfare Advance Development: TI-20 MMM Payload - Development (CEAS)	1	2015	2	2018
Electronic Warfare Advance Development: TI-20 MMM Payload - Lab Test	4	2017	4	2017
Electronic Warfare Advance Development: TI-20 MMM Payload - Transition to EW	2	2018	2	2018
Electronic Warfare Advance Development: APB21/23 Next Gen EW App/APB - Develop	4	2016	2	2019

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 0603562N / *Submarine Tactical Warfare Sys*	**Project (Number/Name)** 0770 / *Adv Sub Supp Equip Prog*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Electronic Warfare Advance Development: APB21/23 Next Gen EW App/APB - Lab Test	3	2018	3	2018
Electronic Warfare Advance Development: APB21/23 Next Gen EW App/APB - Transition to EW	2	2019	2	2019
Electronic Warfare Advance Development: Technical Insertions TI-22 Disposable Buoys - Develop	1	2016	2	2020
Electronic Warfare Advance Development: Technical Insertions TI-22 Disposable Buoys - Lab Test	2	2018	2	2018
Electronic Warfare Advance Development: Technical Insertions TI-22 Disposable Buoys - Pierside/MTV Test	4	2019	4	2019
Electronic Warfare Advance Development: Technical Insertions TI-22 Disposable Buoys - Transition to EW	2	2020	2	2020
Electronic Warfare Advance Development: Technical Insertions Tethered Buoys (Planned) - Develop	1	2018	4	2020
Electronic Warfare Advance Development: Technical Insertions Tethered Buoys (Planned) - Lab Test	2	2020	2	2020
Electronic Warfare Advance Development: Technical Insertions Tethered Buoys (Planned) - Transition to EW	4	2020	4	2020
Electronic Warfare Advance Development: Technical Insertions Precision DF (Planned) - Develop	1	2017	4	2020
Electronic Warfare Advance Development: Technical Insertions Precision DF (Planned) - Lab Test	2	2019	2	2019
Electronic Warfare Advance Development: Technical Insertions Precision DF (Planned) - Lab Test	4	2020	4	2020
Electronic Warfare Advance Development: Technical Insertions Multifunction Aperatures (Planned) - Develop	1	2017	4	2020
Electronic Warfare Advance Development: Technical Insertions Multifunction Aperatures (Planned) - Lab Test	2	2019	2	2019

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 0603562N / *Submarine Tactical Warfare Sys*	**Project (Number/Name)** 0770 / *Adv Sub Supp Equip Prog*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Electronic Warfare Advance Development: Technical Insertions Multifunction Aperatures (Planned) - Lab Test #2	4	2020	4	2020
Electronic Warfare Advance Development: Advanced Radar Development	2	2018	2	2020
Electronic Warfare Advance Development: Advanced Radar Lab Test	2	2019	2	2019
Electronic Warfare Advance Development: Advanced Radar Transition to EW	2	2020	2	2020
Electronic Warfare Advance Development: TI-20 Next Gen EW Human Machine Interface Development	1	2015	4	2018
Electronic Warfare Advance Development: TI-20 Next Gen EW Human Machine Interface Lab Test #1	1	2015	1	2015
Electronic Warfare Advance Development: TI-20 Next Gen EW Human Machine Interface Lab Test #1	3	2017	3	2017
Electronic Warfare Advance Development: TI-20 Next Gen EW Human Machine Interface Transition to EW	4	2018	4	2018
Electronic Warfare Advance Development: TI-20 Next Gen EW Digital EW Direction Finding Development	2	2015	4	2018
Electronic Warfare Advance Development: TI-20 Next Gen EW Digital EW Direction Finding Lab Test #1	2	2014	2	2014
Electronic Warfare Advance Development: TI-20 Next Gen EW Digital EW Direction Finding Lab Test #2	3	2018	3	2018
Electronic Warfare Advance Development: TI-20 Next Gen EW Digital EW Direction Finding Transition to EW	4	2018	4	2018

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 0603562N / *Submarine Tactical Warfare Sys*	Project (Number/Name) 1739 / *Submarine Arctic W/F 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
1739: *Submarine Arctic W/F Development*	40.892	4.868	4.701	6.268	-	6.268	5.906	6.109	5.135	6.845	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Submarine Arctic Warfare Development project responds to the increased threat of submarine and surface ship activity in Arctic regions of the world through the development of advanced submarine concepts. It places particular emphasis on submarine operability and mission support in unique, cold, ice-covered environments. Efforts include assessment of combat system effectiveness, weapons testing, use of High Frequency (HF) sonars in Arctic regions, testing of ice-capable submarine structures, and development of class-specific Arctic operational guidelines. This project also provides the framework for various research and development programs to conduct test and evaluation in shallow water and Arctic regions.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
Title: Conduct ICEX and Arctic Transit Mission, ICEX Workup and Training, Ice Camps	4.868	4.701	6.268	-	6.268
Articles:	-	-	-	-	-
FY 2014 Accomplishments: Conducted Arctic work-up training and ICEX mission 1-2014. Evaluated new display software for the Commercial Off-The-Shelf (COTS) SEABIRD Conductivity, Temperature, and Depth (CTD) probes. Supported Arctic deployments, including inter-Fleet transfers, as required by the SUBFOR Commanders. Investigated, researched, developed and deployed new systems for Arctic submarine support. Supported testing and tactical development required to improve submarine Arctic operability and warfighting.					
FY 2015 Plans: Initiate planning and support for ICEX mission 1-2016 and Ice Camp 1-2016. Support Arctic deployments, including inter-Fleet transfers, as required by the SUBFOR Commanders. Investigate, research, develop and deploy new systems for Arctic submarine support. Support testing and tactical development required to improve submarine Arctic operability and warfighting. Develop Temporary Alteration (TEMPALT) design for High Frequency (HF) sonar on SSN 21 Class Submarines.					
FY 2016 Base Plans: Conduct Arctic work-up training, ICEX mission 1-2016, and Ice Camp 1-2016. Support Arctic deployments, including inter-Fleet transfers, as required by the SUBFOR Commanders. Investigate, research, develop and					

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 0603562N / *Submarine Tactical Warfare Sys*	**Project (Number/Name)** 1739 / *Submarine Arctic W/F Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
deploy new systems for Arctic submarine support. Support testing and tactical development required to improve submarine Arctic operability and warfighting. Initiate planning for ICEX mission 1-2018 and Ice Camp 1-2018. ***FY 2016 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	4.868	4.701	6.268	-	6.268

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Use sole source and competitively awarded contracts through the Fleet Logistics Center (FLC) regional contracting office for equipment and technical services. The NAVSEA University Affiliated Research Center (UARC) omnibus contract is used for procurement of logistics support for Ice Camps and Conductivity, Temperature, and Depth (CTD) probe display software development.

E. Performance Metrics

Conduct and support Arctic deployments, including inter-Fleet transfers, as required by the SUBFOR Commanders.

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 0603562N / *Submarine Tactical Warfare Sys*	**Project (Number/Name)** 1739 / *Submarine Arctic W/F 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
Developmental Test & Evaluation	WR	COMSUBPAC : CA	30.055	3.669	Nov 2013	3.641	Nov 2014	4.283	Nov 2015	-		4.283	Continuing	Continuing	Continuing
Developmental Test & Evaluation	WR	NUWC/Newport : RI	0.235	-		-		-		-		-	-	0.235	0.235
Developmental Test & Evaluation	C/CPFF	UT/ARL : TX	0.760	0.134	Jun 2014	0.175	Feb 2015	0.225	Dec 2015	-		0.225	Continuing	Continuing	Continuing
Developmental Test & Evaluation	C/CPFF	UW/APL : WA	8.528	1.000	Feb 2014	0.825	Jan 2015	1.700	Dec 2015	-		1.700	Continuing	Continuing	Continuing
		Subtotal	39.578	4.803		4.641		6.208		-		6.208	-	-	-

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	EG&G : VA	0.311	-		-		-		-		-	-	0.311	0.311
Program Management Support	C/CPAF	BAE SYSTEMS : MD	0.963	0.065	Mar 2014	0.060	Nov 2014	0.060	Dec 2015	-		0.060	Continuing	Continuing	Continuing
Travel	Allot	NAVSEA PEO IWS 5 : Washington, DC	0.040	-		-		-		-		-	-	0.040	Continuing
		Subtotal	1.314	0.065		0.060		0.060		-		0.060	-	-	-

	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	40.892	4.868		4.701		6.268		-		6.268	-	-	-

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 0603562N / *Submarine Tactical Warfare Sys*	**Project (Number/Name)** 1739 / *Submarine Arctic W/F Development*

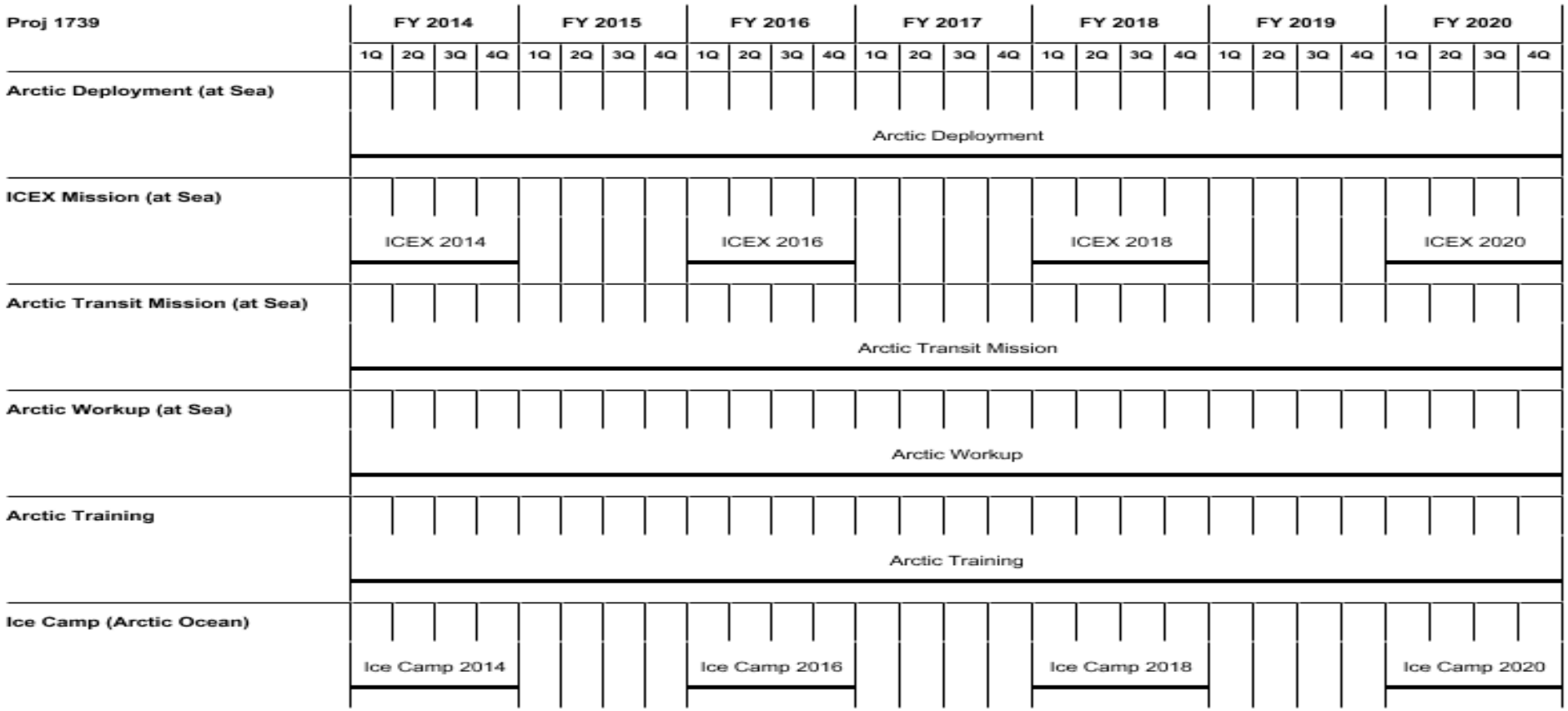

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Exhibit R-4A, RDT&E Schedule Details: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603562N / *Submarine Tactical Warfare Sys*	**Project (Number/Name)** 1739 / *Submarine Arctic W/F Development*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 1739				
Arctic Deployment (at Sea): Submarine Deployment as required by the Submarine Type Commander	1	2014	4	2020
ICEX Mission (at Sea): ICEX Mission (at Sea) 2014	1	2014	4	2014
ICEX Mission (at Sea): ICEX Mission (at Sea) 2016	1	2016	4	2016
ICEX Mission (at Sea): ICEX Mission (at Sea) 2018	1	2018	4	2018
ICEX Mission (at Sea): ICEX Mission (at Sea) 2020	1	2020	4	2020
Arctic Transit Mission (at Sea): Arctic Transit Mission (at Sea)	1	2014	4	2020
Arctic Workup (at Sea): Arctic Workup (at Sea)	1	2014	4	2020
Arctic Training: Arctic Training	1	2014	4	2020
Ice Camp (Arctic Ocean): Ice Camp (Arctic Ocean) 2014	1	2014	4	2014
Ice Camp (Arctic Ocean): Ice Camp (Arctic Ocean) 2016	1	2016	4	2016
Ice Camp (Arctic Ocean): Ice Camp (Arctic Ocean) 2018	1	2018	4	2018
Ice Camp (Arctic Ocean): Ice Camp (Arctic Ocean) 2020	1	2020	4	2020