

**UNCLASSIFIED**

**Exhibit R-2, RDT&E Budget Item Justification:** PB 2023 Navy **Date:** April 2022

<b>Appropriation/Budget Activity</b> 1319: <i>Research, Development, Test &amp; Evaluation, Navy / BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604562N / <i>Submarine Tactical Warfare System</i>
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COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	716.153	69.351	62.115	58.741	-	58.741	69.358	67.894	67.545	68.632	Continuing	Continuing
0236: <i>SSN Comb Cont Sys Imprvmnt (ENG)</i>	716.153	62.115	62.115	58.741	-	58.741	69.358	67.894	67.545	68.632	Continuing	Continuing
9999: <i>Congressional Adds</i>	0.000	7.236	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	7.236

**A. Mission Description and Budget Item Justification**

The AN/BYG-1 is the combat control system common across all submarine platforms which incorporates tactical control, weapon/payload control and Tactical Local Area Network (TacLAN) functions into a single procurement program. AN/BYG-1 allows the submarine to rapidly update the ship-safety tactical picture, integrates the common tactical picture into the battlegroup, improves torpedo interfaces, and provides tactical TOMAHAWK and Harpoon capability. AN/BYG-1 systems will be continuously updated with hardware enhancements to address Commercial Off The Shelf (COTS) obsolescence, and provide capability improvements through software upgrades. Hardware updates are referred to as Tech Insertion (TI) kits and are differentiated by year of development (i.e. TI-20, TI-22, TI-24, etc.). The TI upgrades provide the baseline for all future AN/BYG-1 procurements. AN/BYG-1 is part of the Submarine Warfare Federated Tactical Systems (SWFTS), a family of interdependent systems that conduct cooperative system development and installations.

Project Unit 0236: This program develops Commercial-Off-The-Shelf (COTS) based software and hardware upgrades for AN/BYG-1, the Multi-tube Weapons Simulator (MTWS), and the Common Weapon Launcher (CWL) in order to integrate improved tactical and payload control capabilities for all submarine classes. This program also develops new payload capabilities for the Submarine Launched Unmanned Aerial System (SLUAS).

In FY23, the Navy continues to pursue a transformation across the Submarine Warfare Federated Tactical Systems (SWFTS) (PE 0604503N Project 0219, PE 0604562N Project 0236, PE 0604777N Project 0253 and PE 0604503N Project 0775) to maximize SWFTS cyber-resiliency and the speed of capability delivery. The transformation is being accomplished through a transition to Agile development processes comprised of a continuous series of 12-week software program increments in a DevSecOps environment. This process will better align with industry practice and enable the SWFTS systems to leverage industry capability improvements in Artificial Intelligence/Machine Learning (AI/ML) and other emerging technologies, while also being more responsive to cyber needs. The transformation is aligned to the requirements contained in the AN/BYG-1 Capability Development Document, and to the requirements contained in the Office of the Chief of Naval Operations (OPNAV) requirement Itr 9010, Ser N97/19U141554 of 22 May 2019.

Submarine Launched Unmanned Aerial System (SLUAS) incorporates unmanned aerial vehicles, vehicle encapsulating canisters, vehicle command and control capabilities, and vehicle stowage into submarines. SLUAS extends the sensor range of the submarine, serving as a key enabler of Over-The-Horizon (OTH) weapons employment.

Provides funding for the development of the Common Weapon Launcher; Legacy Launchers; Multi-tube Weapons Simulator (MTWS); Information Assurance system; Onboard Team Trainer (OBTT); Command, Control, Computer and Intelligence Maintenance Tool (C3IMT); and Common Infrastructure Services (CIS) subsystem. This

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<b>Appropriation/Budget Activity</b> 1319: <i>Research, Development, Test &amp; Evaluation, Navy / BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604562N / <i>Submarine Tactical Warfare System</i>
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includes integration of Onboard Team Trainer - Master Controller (OBTT - MC) & Command, Control, Computer and Intelligence Maintenance Tool/Inter-Subsystem Monitoring Tool (ISMT) efforts as well as other common services within Submarine Warfare Federated Tactical System (SWFTS).

FY23 continues funding for development of TI-22 and begins funding development of TI-24. Cybersecurity efforts continue to grow due to increasing interconnection complexity, more IP based traffic in future baselines, and development of Cyber Safe Controls. Integration efforts for additional submarine payloads including Contender, Maritime Strike Tomahawk (MST), Next Generation Countermeasure, Anti-Torpedo Torpedo Compact Rapid Attack Weapons program (ATT CRAW) continue in FY23. FY23 also continues efforts to support classified payloads.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023 Base</b>	<b>FY 2023 OCO</b>	<b>FY 2023 Total</b>
Previous President's Budget	71.093	62.115	0.000	-	0.000
Current President's Budget	69.351	62.115	58.741	-	58.741
Total Adjustments	-1.742	0.000	58.741	-	58.741
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.742	0.000			
• Program Adjustments	0.000	0.000	0.000	-	0.000
• Rate/Misc Adjustments	0.000	0.000	0.000	-	0.000
• Adjustments to Budget Year	-	-	58.741	-	58.741

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** 9999: *Congressional Adds*

Congressional Add: *Combat Systems of the Future End-to-End Cyber Security Tools*

Congressional Add Subtotals for Project: 9999

Congressional Add Totals for all Projects

	<b>FY 2021</b>	<b>FY 2022</b>
Congressional Add: <i>Combat Systems of the Future End-to-End Cyber Security Tools</i>	7.236	0.000
Congressional Add Subtotals for Project: 9999	7.236	0.000
Congressional Add Totals for all Projects	7.236	0.000

**Change Summary Explanation**

The FY 2023 funding request was reduced by \$5.400 million to account for the availability of prior year execution balances.

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FY 2023 funding increase reflects the fact that the FY 2022 President's Budget request did not include out-year funding.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2023 Navy										<b>Date:</b> April 2022		
<b>Appropriation/Budget Activity</b> 1319 / 5					<b>R-1 Program Element (Number/Name)</b> PE 0604562N / <i>Submarine Tactical Warfare System</i>				<b>Project (Number/Name)</b> 0236 / <i>SSN Comb Cont Sys Imprvmnt (ENG)</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023 Base</b>	<b>FY 2023 OCO</b>	<b>FY 2023 Total</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
0236: <i>SSN Comb Cont Sys Imprvmnt (ENG)</i>	716.153	62.115	62.115	58.741	-	58.741	69.358	67.894	67.545	68.632	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The AN/BYG-1 is the combat control system common across all submarine platforms which incorporates tactical control, weapon/payload control and Tactical Local Area Network (TacLAN) functions into a single procurement program. AN/BYG-1 allows the submarine to rapidly update the ship-safety tactical picture, integrates the common tactical picture into the battlegroup, improves torpedo interfaces, and provides tactical TOMAHAWK and Harpoon capability. AN/BYG-1 systems will be continuously updated with hardware enhancements to address Commercial Off The Shelf (COTS) obsolescence, and provide capability improvements through software upgrades. Hardware updates are referred to as Tech Insertion (TI) kits and are differentiated by year of development (i.e. TI-20, TI-22, TI-24, etc.). The TI upgrades provide the baseline for all future AN/BYG-1 procurements. AN/BYG-1 is part of the Submarine Warfare Federated Tactical Systems (SWFTS), a family of interdependent systems that conduct cooperative system development and installations.

Project Unit 0236: This program develops Commercial-Off-The-Shelf (COTS) based software and hardware upgrades for AN/BYG-1, the Multi-tube Weapons Simulator (MTWS), and the Common Weapon Launcher (CWL) in order to integrate improved tactical and payload control capabilities for all submarine classes. This program also develops new payload capabilities for the Submarine Launched Unmanned Aerial System (SLUAS).

In FY23, the Navy continues to pursue a transformation across the Submarine Warfare Federated Tactical Systems (SWFTS) (PE 0604503N Project 0219, PE 0604562N Project 0236, PE 0604777N Project 0253 and PE 0604503N Project 0775) to maximize SWFTS cyber-resiliency and the speed of capability delivery. The transformation is being accomplished through a transition to Agile development processes comprised of a continuous series of 12-week software program increments in a DevSecOps environment. This process will better align with industry practice and enable the SWFTS systems to leverage industry capability improvements in AI/ML and other emerging technologies, while also being more responsive to cyber needs. The transformation is aligned to the requirements contained in the AN/BYG-1 Capability Development Document, and to the requirements contained in the OPNAV requirement Itr 9010, Ser N97/19U141554 of 22 May 2019.

SLUAS incorporates unmanned aerial vehicles, vehicle encapsulating canisters, vehicle command and control capabilities, and vehicle stowage into submarines. SLUAS extends the sensor range of the submarine, serving as a key enabler of Over-The-Horizon (OTH) weapons employment.

Provides funding for the development of the Common Weapon Launcher; Legacy Launchers; Multi-tube Weapons Simulator (MTWS); Information Assurance system; Onboard Team Trainer (OBTT); Command, Control, Computer and Intelligence Maintenance Tool (C3IMT); and Common Infrastructure Services (CIS) subsystem. This includes integration of Onboard Team Trainer - Master Controller (OBTT - MC) & Command, Control, Computer and Intelligence Maintenance Tool/Inter-Subsystem Monitoring Tool (ISMT) efforts as well as other common services within Submarine Warfare Federated Tactical System (SWFTS).

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2023 Navy			<b>Date:</b> April 2022																				
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604562N / <i>Submarine Tactical Warfare System</i>	<b>Project (Number/Name)</b> 0236 / <i>SSN Comb Cont Sys Imprvmnt (ENG)</i>																					
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<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>																							
<b>Title:</b> AN/BYG-1 Software Development																							
<b>Articles:</b>																							
<table border="1"> <thead> <tr> <th></th> <th>FY 2021</th> <th>FY 2022</th> <th>FY 2023 Base</th> <th>FY 2023 OCO</th> <th>FY 2023 Total</th> </tr> </thead> <tbody> <tr> <td></td> <td align="right">25.518</td> <td align="right">22.275</td> <td align="right">18.691</td> <td align="right">0.000</td> <td align="right">18.691</td> </tr> <tr> <td></td> <td align="right">-</td> <td align="right">-</td> <td align="right">-</td> <td align="right">-</td> <td align="right">-</td> </tr> </tbody> </table>							FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total		25.518	22.275	18.691	0.000	18.691		-	-	-	-	-
	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total																		
	25.518	22.275	18.691	0.000	18.691																		
	-	-	-	-	-																		
<b>FY 2022 Plans:</b> Complete development of TI-20 baseline for VA Class and COLUMBIA SSBN Class submarines. Deliver TI-20 (TI-20/APB-21) baseline. Begin development of TI-22 (TI-22/APB-23) for 688 Class and SSN21 Class submarines.																							
<b>FY 2023 Base Plans:</b> Continue development of TI-22 (TI-22/APB-23) for 688 Class and SSN21 Class submarines.																							
<b>FY 2023 OCO Plans:</b> N/A																							
<b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding decrease attributed to delay of TI-22 hardware integration and development efforts.																							
<b>Title:</b> AN/BYG-1 TI-22 Hardware Development																							
<b>Articles:</b>																							
<table border="1"> <tbody> <tr> <td></td> <td align="right">3.538</td> <td align="right">8.632</td> <td align="right">9.521</td> <td align="right">0.000</td> <td align="right">9.521</td> </tr> <tr> <td></td> <td align="right">-</td> <td align="right">-</td> <td align="right">-</td> <td align="right">-</td> <td align="right">-</td> </tr> </tbody> </table>							3.538	8.632	9.521	0.000	9.521		-	-	-	-	-						
	3.538	8.632	9.521	0.000	9.521																		
	-	-	-	-	-																		
<b>FY 2022 Plans:</b> Continue development, integration, and test of AN/BYG-1 (TI-22) for SSN 688 Class and SSN21 Class.																							
<b>FY 2023 Base Plans:</b> Complete development, integration, and test of AN/BYG-1 (TI-22) for SSN 688 Class and SSN21 Class.																							
<b>FY 2023 OCO Plans:</b> N/A																							
<b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding increase attributable to development, integration, and test of the next generation AN/BYG-1 (TI-22) hardware.																							
<b>Title:</b> AN/BYG-1 TI-20 Hardware Development																							
<table border="1"> <tbody> <tr> <td></td> <td align="right">8.401</td> <td align="right">4.924</td> <td align="right">0.000</td> <td align="right">0.000</td> <td align="right">0.000</td> </tr> </tbody> </table>							8.401	4.924	0.000	0.000	0.000												
	8.401	4.924	0.000	0.000	0.000																		

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<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604562N / <i>Submarine Tactical Warfare System</i>	<b>Project (Number/Name)</b> 0236 / <i>SSN Comb Cont Sys Imprvmnt (ENG)</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023 Base</b>	<b>FY 2023 OCO</b>	<b>FY 2023 Total</b>
<p align="right"><b>Articles:</b></p> <p><b>FY 2022 Plans:</b> Complete development, integration and test of AN/BYG-1 (TI-20) for SSN VA Class and COLUMBIA SSBN submarines to include Common Weapon Launcher modernization development.</p> <p><b>FY 2023 Base Plans:</b> N/A</p> <p><b>FY 2023 OCO Plans:</b> N/A</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> TI-20 hardware development efforts concluded in FY 2022.</p>	-	-	-	-	-
<p><b>Title:</b> AN/BYG-1 TI-24 Hardware Development</p> <p align="right"><b>Articles:</b></p> <p><b>FY 2022 Plans:</b> N/A</p> <p><b>FY 2023 Base Plans:</b> Begin development, integration and test of AN/BYG-1 (TI-24) for VA Class and COLUMBIA SSBN Class submarines.</p> <p><b>FY 2023 OCO Plans:</b> N/A</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding increase attributable to commencement of development efforts for TI-24.</p>	0.000 -	0.000 -	3.356 -	0.000 -	3.356 -
<p><b>Title:</b> Payload Integration</p> <p align="right"><b>Articles:</b></p> <p><b>FY 2022 Plans:</b> Continue software development efforts to support submarine payload integration of MK 48 APB5+/APB6, Contender, and Maritime Strike Tomahawk. Continue integration of Harpoon BLK 1C into Payload Control System.</p>	6.610 -	6.467 -	6.940 -	0.000 -	6.940 -

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<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023 Base</b>	<b>FY 2023 OCO</b>	<b>FY 2023 Total</b>
<p>Continue support of planning/prototyping for classified payloads.</p> <p><b>FY 2023 Base Plans:</b> Continue software development efforts to support submarine payload integration of MK 48 APB5+/APB6, Contender, and Maritime Strike Tomahawk. Continue integration of Harpoon BLK 1C into Payload Control System.</p> <p>Continue support of planning/prototyping for classified payloads.</p> <p><b>FY 2023 OCO Plans:</b> N/A</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding increase attributable to additional payload integration efforts.</p>					
<p><b>Title:</b> Testing</p> <p align="right"><b>Articles:</b></p>	3.202 -	3.168 -	3.217 -	0.000 -	3.217 -
<p><b>FY 2022 Plans:</b> Complete APB-19 DT on 688/SSBN/SSGN.</p> <p><b>FY 2023 Base Plans:</b> Begin and complete 75% of planned DT on VA Class and COLUMBIA SSBN Class Submarines.</p> <p><b>FY 2023 OCO Plans:</b> N/A</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Minor increase due to inflation.</p>					
<p><b>Title:</b> CyberSecurity</p> <p align="right"><b>Articles:</b></p>	6.793 -	8.435 -	8.621 -	0.000 -	8.621 -
<p><b>FY 2022 Plans:</b> Commence development of CyberSecurity Toolkit and IA certification Testing on BYG-1 TI-22. Continue Risk Management Framework (RMF) accreditations for various systems.</p>					

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<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>						
		<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023 Base</b>	<b>FY 2023 OCO</b>	<b>FY 2023 Total</b>
Commence development work on Raise the Bar Cybersecurity requirements for AN/BYG-1.						
<b>FY 2023 Base Plans:</b> Continue development of CyberSecurity Toolkit and IA certification Testing on BYG-1 TI-22. Continue RMF accreditations for various systems.						
<b>FY 2023 OCO Plans:</b> N/A						
<b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Minor increase due to inflation.						
<b>Title:</b> Unmanned Aerial System (UAS)		2.237	2.282	2.332	0.000	2.332
	<b>Articles:</b>	-	-	-	-	-
<b>FY 2022 Plans:</b> Continue Unmanned Aerial System development and integration efforts for 3 inch Submarine launched UAS.						
<b>FY 2023 Base Plans:</b> Continue Unmanned Aerial System development and integration efforts for 3 inch Submarine launched UAS.						
<b>FY 2023 OCO Plans:</b> N/A						
<b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Minor increase due to inflation.						
<b>Title:</b> Common Infrastructure Services (CIS)		5.816	5.932	6.063	0.000	6.063
	<b>Articles:</b>	-	-	-	-	-
<b>FY 2022 Plans:</b> Continue integration for Common Infrastructure Services to include Onboard Team Trainer - Master Controller & Command, Control, Computer and Intelligence Maintenance Tool/Inter-Subsystem Monitoring Tool (ISMT) efforts as well as other common services within SWFTS.						
<b>FY 2023 Base Plans:</b> Continue integration for Common Infrastructure Services to include Onboard Team Trainer - Master Controller &						

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<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023 Base</b>	<b>FY 2023 OCO</b>	<b>FY 2023 Total</b>
Command, Control, Computer and Intelligence Maintenance Tool/Inter-Subsystem Monitoring Tool (ISMT) efforts as well as other common services within SWFTS.  <b>FY 2023 OCO Plans:</b> N/A  <b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Minor increase due to inflation.					
<b>Accomplishments/Planned Programs Subtotals</b>	62.115	62.115	58.741	0.000	58.741

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023 Base</u>	<u>FY 2023 OCO</u>	<u>FY 2023 Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• OPN/5420: SSN <i>Combat Control Systems</i>	162.164	128.117	128.874	-	128.874	125.711	143.528	140.674	143.243	Continuing	Continuing

**Remarks**

**D. Acquisition Strategy**  
 This budget line integrates software (APBs) developed by the advanced development community. This program has been tailored in accordance with the new DoD5000 directive to incorporate annual Milestone Decision Authority (MDA) production reviews. Software products associated with AN/BYG-1 will be available for release to the Fleet every 12 weeks per the AGILE software development process.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy												Date: April 2022			
Appropriation/Budget Activity 1319 / 5						R-1 Program Element (Number/Name) PE 0604562N / Submarine Tactical Warfare System				Project (Number/Name) 0236 / SSN Comb Cont Sys Imprvmt (ENG)					
Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
AN/BYG-1 TECH INSERTION	C/CPIF	GENERAL DYNAMICS (GDAIS) : FAIR LAKES, VA	123.299	9.188	Oct 2020	9.199	Oct 2021	6.945	Oct 2022	-		6.945	Continuing	Continuing	Continuing
AN/BYG-1 TECH INSERTION	C/CPIF	PROGENY (PCS) : MANASSAS, VA	26.135	9.205	Oct 2020	9.207	Oct 2021	6.958	Oct 2022	-		6.958	Continuing	Continuing	Continuing
GOVERNMENT ENGINEERING	WR	NUWC : NEWPORT, RI	94.293	4.671	Oct 2020	4.675	Oct 2021	4.769	Oct 2022	-		4.769	Continuing	Continuing	Continuing
CYBERSECURITY	C/CPAF	PROGENY : MANASSAS, VA	57.177	7.556	Oct 2020	7.505	Oct 2021	7.897	Oct 2022	-		7.897	Continuing	Continuing	Continuing
UNMANNED AERIAL SYSTEM	WR	NUWC : NEWPORT, RI	3.880	1.735	Oct 2020	1.736	Oct 2021	1.802	Oct 2022	-		1.802	Continuing	Continuing	Continuing
UNMANNED AERIAL SYSEM	C/CPIF	PROGENY (PCS) : MANASSAS, VA	1.841	0.492	Oct 2020	0.494	Oct 2021	0.583	Oct 2022	-		0.583	Continuing	Continuing	Continuing
<b>Subtotal</b>			306.625	32.847		32.816		28.954		-		28.954	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
SOFTWARE INTEGRATION	C/CPIF	GENERAL DYNAMICS (GDAIS) : FAIRLAKES, VA	111.159	7.528	Oct 2020	7.529	Oct 2021	7.680	Oct 2022	-		7.680	Continuing	Continuing	Continuing
SOFTWARE INTEGRATION	WR	NUWC : NEWPORT, RI	73.321	4.648	Oct 2020	4.650	Oct 2021	4.743	Oct 2022	-		4.743	Continuing	Continuing	Continuing
SOFTWARE INTEGRATION	C/CPAF	LOCKHEED MARTIN (LM-MSS) : MANASSAS, VA	29.446	3.690	Oct 2020	3.695	Oct 2021	3.768	Oct 2022	-		3.768	Continuing	Continuing	Continuing
SOFTWARE INTEGRATION	C/CPFF	PROGENY (PCS) : MANASSAS, VA	19.385	4.623	Oct 2020	4.627	Oct 2021	4.720	Oct 2022	-		4.720	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy												Date: April 2022			
Appropriation/Budget Activity 1319 / 5				R-1 Program Element (Number/Name) PE 0604562N / Submarine Tactical Warfare System				Project (Number/Name) 0236 / SSN Comb Cont Sys Imprvmnt (ENG)							
Support (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
SOFTWARE DEVELOPMENT	Various	VARIOUS : Not Specified	60.920	2.427	Oct 2020	2.429	Oct 2021	2.478	Oct 2022	-		2.478	Continuing	Continuing	Continuing
HARPOON PLATFORM INTEGRATION	C/CPFF	PROGENY : MANASSAS, VA	0.500	0.510	Oct 2020	0.512	Oct 2021	0.522	Oct 2022	-		0.522	0.000	2.044	-
<b>Subtotal</b>			294.731	23.426		23.442		23.911		-		23.911	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
DEVELOPMENT TEST & EVALUATION	WR	NUWC : NEWPORT, RI	41.010	1.012	Oct 2020	1.014	Oct 2021	1.014	Oct 2022	-		1.014	Continuing	Continuing	Continuing
TEST & EVALUATION	C/CPFF	GENERAL DYNAMICS : FAIRLAKES, VA	12.382	0.773	Oct 2020	0.775	Oct 2021	0.775	Oct 2022	-		0.775	Continuing	Continuing	Continuing
TEST & EVALUATION	C/CPFF	GENERAL DYNAMICS : PITTSFIELD, MA	6.484	0.761	Oct 2020	0.763	Oct 2021	0.763	Oct 2022	-		0.763	Continuing	Continuing	Continuing
TEST & EVALUATION	C/CPAF	PROGENY : MANASSAS, VA	3.783	0.504	Oct 2020	0.507	Oct 2021	0.507	Oct 2022	-		0.507	Continuing	Continuing	Continuing
OPERATIONAL TEST & EVALUATION	WR	COMOPTEVFOR : NORFOLK, VA	19.407	0.843	Oct 2020	0.844	Oct 2021	0.844	Oct 2022	-		0.844	Continuing	Continuing	Continuing
<b>Subtotal</b>			83.066	3.893		3.903		3.903		-		3.903	Continuing	Continuing	N/A
Management Services (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
PROGRAM MANAGEMENT SUPPORT	C/CPFF	VARIOUS : Not Specified	31.731	1.949	Oct 2020	1.954	Oct 2021	1.973	Oct 2022	-		1.973	Continuing	Continuing	Continuing
<b>Subtotal</b>			31.731	1.949		1.954		1.973		-		1.973	Continuing	Continuing	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis:</b> PB 2023 Navy							<b>Date:</b> April 2022				
<b>Appropriation/Budget Activity</b> 1319 / 5			<b>R-1 Program Element (Number/Name)</b> PE 0604562N / <i>Submarine Tactical Warfare System</i>			<b>Project (Number/Name)</b> 0236 / <i>SSN Comb Cont Sys Imprvmnt (ENG)</i>					
	<b>Prior Years</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023 Base</b>	<b>FY 2023 OCO</b>	<b>FY 2023 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>		
<b>Project Cost Totals</b>	716.153	62.115	62.115	58.741	-	58.741	Continuing	Continuing	N/A		

**Remarks**

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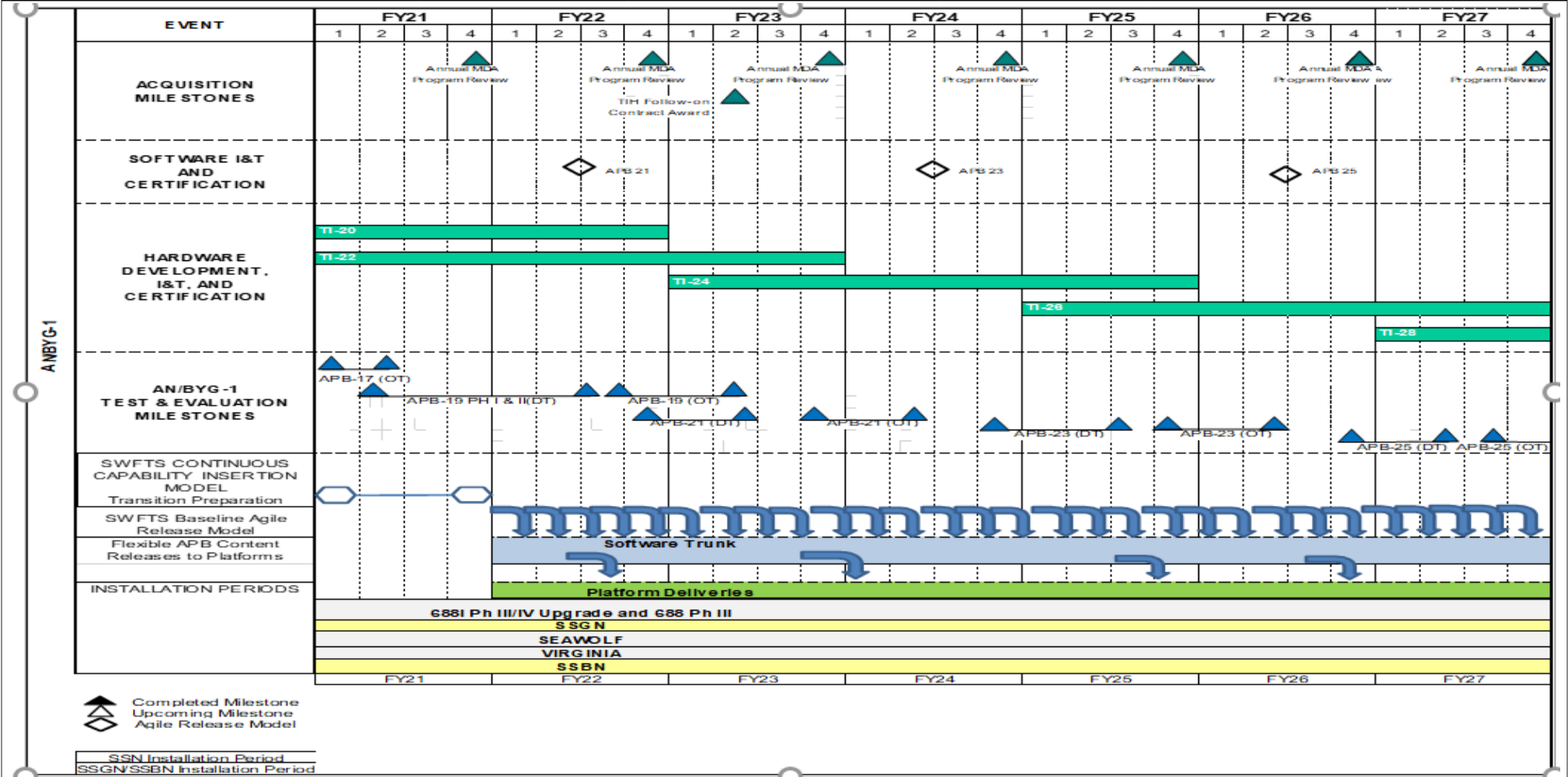
Exhibit R-4, RDT&E Schedule Profile: PB 2023 Navy

Date: April 2022

Appropriation/Budget Activity  
1319 / 5

R-1 Program Element (Number/Name)  
PE 0604562N / Submarine Tactical Warfare System

Project (Number/Name)  
0236 / SSN Comb Cont Sys Imprvmt (ENG)



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2023 Navy		<b>Date:</b> April 2022
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604562N / <i>Submarine Tactical Warfare System</i>	<b>Project (Number/Name)</b> 0236 / <i>SSN Comb Cont Sys Imprvmnt (ENG)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Page 1</b>				
Acq Milestones: Annual MDA Program Review - FY21	4	2021	4	2021
Acq Milestones: Annual MDA Program Review - FY22	4	2022	4	2022
Acq Milestones: Annual MDA Program Review - FY23	4	2023	4	2023
Acq Milestones: Annual MDA Program Review - FY24	4	2024	4	2024
Acq Milestones: Annual MDA Program Review - FY25	4	2025	4	2025
Acq Milestones: Annual MDA Program Review - FY26	4	2026	4	2026
Acq Milestones: Annual MDA Program Review - FY27	4	2027	4	2027
Acq Milestones: TIH Follow-on Contract Award	2	2023	2	2023
Software I&T, Certification: Software I&T, Certification: APB-21	2	2022	3	2022
Software I&T, Certification: Software I&T, Certification: APB-23	2	2024	3	2024
Software I&T, Certification: Software I&T, Certification: APB-25	2	2026	3	2026
Hardware Development, I&T Certification: Hardware Development, I&T Certification: TI-20	1	2021	4	2022
Hardware Development, I&T Certification: Hardware Development, I&T Certification: TI-22	1	2021	4	2023
Hardware Development, I&T Certification: Hardware Development, I&T Certification: TI-24	1	2023	4	2025
Hardware Development, I&T Certification: Hardware Development, I&T Certification: TI-26	1	2025	4	2027
Hardware Development, I&T Certification: Hardware Development, I&T Certification: TI-28	1	2027	4	2027
Test & Evaluation Milestones: AN/BYG-1: APB-17 OT	1	2021	2	2021

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**Exhibit R-4A, RDT&E Schedule Details: PB 2023 Navy** **Date:** April 2022

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604562N / <i>Submarine Tactical Warfare System</i>	<b>Project (Number/Name)</b> 0236 / <i>SSN Comb Cont Sys Imprvmt (ENG)</i>
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<b>Events by Sub Project</b>	<b>Start</b>		<b>End</b>	
	<b>Quarter</b>	<b>Year</b>	<b>Quarter</b>	<b>Year</b>
Test & Evaluation Milestones: AN/BYG-1: APB-19 DT	2	2021	3	2022
Test & Evaluation Milestones: AN/BYG-1: APB-19 OT	3	2022	2	2023
Test & Evaluation Milestones: AN/BYG-1: APB-21 DT	4	2022	2	2023
Test & Evaluation Milestones: AN/BYG-1: APB-21 OT	4	2023	2	2024
Test & Evaluation Milestones: AN/BYG-1: APB-23 DT	4	2024	3	2025
Test & Evaluation Milestones: AN/BYG-1: APB-23 OT	4	2025	2	2026
Test & Evaluation Milestones: AN/BYG-1: APB-25 DT	4	2026	2	2027
Test & Evaluation Milestones: AN/BYG-1: APB-25 OT	3	2027	4	2027

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**Exhibit R-2A, RDT&E Project Justification:** PB 2023 Navy **Date:** April 2022

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604562N / <i>Submarine Tactical Warfare System</i>	<b>Project (Number/Name)</b> 9999 / <i>Congressional Adds</i>
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COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
9999: <i>Congressional Adds</i>	0.000	7.236	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	7.236
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

FY21 congressional adds provide funding to develop Inter-Subsystem Monitoring Tool (ISMT) Cyber Dashboard Prototype (\$3.862M), develop improvements to the Inter-Subsystem Monitoring Tool (ISMT) On-Board Team Training Master Controller (OBTT-MC) (\$1.000M) and support Security Information & Event Management (SIEM) tool integration into BYG-1/SWFTS for cyber monitoring and data gathering (\$2.374M).

Provides funding to develop a comprehensive network cybersecurity monitoring prototype to assist the operator in identifying cybersecurity threats and provide awareness and guidance to maintain cyber resiliency. The ISMT Cyber dashboard prototype utilizes a web display to provide the capability to generate a Commanding Officers (CO) Report integrating cyber-related data from the comprehensive network-monitoring tool. Utilizing cybersecurity gold standard guidelines, the tool will be designed within an advanced cybersecurity architecture, providing a cyber resilient infrastructure. As part of the design and requirements gathering, the architecture will leverage existing Submarine Warfare Federated Tactical System (SWFTS)/BYG-1 data as well as provide additional cyber data and/or functionality needed to provide shipboard cybersecurity monitoring and alerts.

Execute ISMT Cyber Dashboard Prototype:

- Purchase and setup laboratory equipment
- Develop sub-views, features, data processing layer, external alerting, and installation configuration layer
- Produce procedures for cyber trouble shooting
- Develop user training via the Onboard Tactical Trainer (OBTT)

Efforts provide program management, systems engineering, software engineering, configuration management, quality assurance, test and evaluation, logistics and supportability engineering for Inter Subsystem Monitoring Tool (ISMT) and On-Board Team Trainer-Master Controller (OBTT-MC). ISMT and OBTT-MC will be integrated into the AN/BYG-1 Combat Control System on SSN688/688I, SSGN, SSN21, SSBN, and Virginia Class Submarines. There also will be effort for SSBN submarines for both modernization and new construction in future software builds. ISMT and OBTT-MC support key SWFTS integration milestones during Continuous Integration/Continuous Development (CI/CD) process.

Provides funding to continue to develop a display that would provide more intuitive Cyber Alerts and to perform real time Audit Reduction and alerting in order to aid the Operator in performing required weekly Audit reviews.

This funding will:

- Enhance the Daily Reporting Feature

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2023 Navy		<b>Date:</b> April 2022	
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604562N / <i>Submarine Tactical Warfare System</i>	<b>Project (Number/Name)</b> 9999 / <i>Congressional Adds</i>	
<p>-Integrate a Commercial Off the Shelf Security Information Event Management (COTS) SIEM tool on the back-end to provide the Operator with Enhanced Threat Detection Capabilities.</p> <p>-Provide the Operator with a Visualization of Cyber Network Monitoring Capabilities (Continuation of CI 4021-2019)</p> <p>-Add a feature that allows Operators to Clear/acknowledge Dashboard alerts to remove false positives from the Cybersecurity Alert Interface on the BYG-1 common header.</p> <p>-Improve upon the IA Dashboard Alert descriptions with Corrective Actions</p>			
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2021</b>	<b>FY 2022</b>
<b>Congressional Add:</b> Combat Systems of the Future End-to-End Cyber Security Tools		7.236	0.000
<b>FY 2021 Accomplishments:</b> Inter-Subsystem Monitoring Tool (ISMT) Cyber Dashboard Prototype			
Purchased laboratory equipment for development of the cyber dashboard.			
Continued development of the sub-views, features, and data processing layer. Begin development of the user training for operator onboard the submarine platform.			
Began production of the final build for delivery.			
Security Information & Event Management (SIEM) tool integration into BYG-1/SWFTS for cyber monitoring and data gathering			
Continued development of the SIEM tool to further incorporate drill down alerts to provide more detail for the fleet.			
Continued to integrate the SIEM tool on the back-end to provide the Operator with Enhanced Threat Detection Capabilities and to improve IA alert Dashboard notifications, descriptions and corrective actions in FY21.			
<b>FY 2022 Plans:</b> Inter-Subsystem Monitoring Tool (ISMT) On-Board Team Training Master Controller (OBTT-MC)			
Purchase laboratory equipment, provide engineering support and BYG-1 and SWFTS Integration support for ISMT and OBTT- MC development and delivery in CI/CD Environment.			
<b>Congressional Adds Subtotals</b>		7.236	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2023 Navy		<b>Date:</b> April 2022
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604562N / <i>Submarine Tactical Warfare System</i>	<b>Project (Number/Name)</b> 9999 / <i>Congressional Adds</i>
<b>C. Other Program Funding Summary (\$ in Millions)</b> N/A		
<b>Remarks</b>		
<b>D. Acquisition Strategy</b> Inter-Subsystem Monitoring Tool (ISMT) Cyber Dashboard Prototype:  Once developed, the ISMT Cyber Dashboard would be part of the Program Insertion (PI) software baselines, utilizing the same Acquisition Strategy as the Tactical Warfare System.  Actual insertion point is being evaluated by the Program Office for Release-To-Fleet.  Inter-Subsystem Monitoring Tool (ISMT) On-Board Team Training Master Controller (OBTT-MC):  Once developed, the ISMT and OBTT-MC modifications would be part of the Program Insertion (PI) software baselines, utilizing the same Acquisition Strategy as the Tactical Warfare System.  This program has been tailored in accordance with the new DoD5000 directive to incorporate annual MDA production reviews.  Insertion point for enhance capability is being evaluated by the Program Office for Release-To-Fleet.		



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2023 Navy</b>		<b>Date:</b> April 2022
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604562N / <i>Submarine Tactical Warfare System</i>	<b>Project (Number/Name)</b> 9999 / <i>Congressional Adds</i>

	EVENT	FY20				FY21				FY22			
		1	2	3	4	1	2	3	4	1	2	3	4
AN/BYG-1	ISMT CyberDashboard					▲	—		▲				
	ISMT/OBTT-MC									▲	—		▲
	Security Information & Event Management (SEIM)							▲	—				▲
		FY20				FY21				FY22			

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2023 Navy		<b>Date:</b> April 2022
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604562N / <i>Submarine Tactical Warfare System</i>	<b>Project (Number/Name)</b> 9999 / <i>Congressional Adds</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Proj 9999</b>				
CSOF: ISMT Cyber Dashboard	2	2021	4	2021
Rite Solutions: ISMT/OBTT- MC	1	2022	4	2022
Progeny: Security Information & Event Management (SIEM) Tool	3	2021	3	2022