Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy											Date: February 2018	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603123N *I Force Protection Advanced Technology*							
COST ($ in Millions)	**Prior Years**	**FY 2017**	**FY 2018**	**FY 2019 Base**	**FY 2019 OCO**	**FY 2019 Total**	**FY 2020**	**FY 2021**	**FY 2022**	**FY 2023**	**Cost To Complete**	**Total Cost**
Total Program Element	0.000	83.146	26.342	2.423	-	2.423	2.447	2.503	2.518	2.561	Continuing	Continuing
2912: *Force Protection Advanced Technology*	0.000	41.810	23.568	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	65.378
3049: *Force Protection*	0.000	2.650	2.774	2.423	-	2.423	2.447	2.503	2.518	2.561	Continuing	Continuing
9999: *Congressional Adds*	0.000	38.686	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	38.686

Note

The funding decrease from FY18 to FY19 reflects the realignment and consolidation of resources from the current Program Element (PE) Project 2912 to the new FY19 Navy Advanced Technology Development (ATD) PE 0603671N, in the Navy Advanced Technology Project 3433. Specific efforts transferred from this PE include all planned continuing and initiating research associated with the Surface Ship and Submarine Hull Mechanical and Electrical, and Aircraft Technology research efforts.

A. Mission Description and Budget Item Justification

The efforts described in this Program Element (PE) are based on investment directions as defined in the Naval S&T Strategic Plan approved by the S&T Corporate Board. This strategy is based on needs and capabilities from Navy and Marine Corps guidance and input from the Naval Research Enterprise (NRE) stakeholders (including the Naval enterprises, the combatant commands, the Chief of Naval Operations (CNO), and Headquarters Marine Corps). It provides the vision and key objectives for the essential science and technology efforts that will enable the continued supremacy of U.S. Naval forces in the 21st century. The Strategy focuses and aligns Naval S&T with Naval missions and future capability needs that address the complex challenges presented by both rising peer competitors and irregular/ asymmetric warfare.

This PE addresses advanced technology development associated with providing the capability of Platform and Force Protection for the U.S. Navy. This program supports the development of technologies associated with all naval platforms (surface, subsurface, terrestrial and air) and the protection of those platforms.

Due to the number of efforts in this PE, the programs described herein are representative of the work included in this PE.

Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy	Date: February 2018
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603123N *I Force Protection Advanced Technology*

B. Program Change Summary ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	48.438	26.342	37.032	-	37.032
Current President's Budget	83.146	26.342	2.423	-	2.423
Total Adjustments	34.708	0.000	-34.609	-	-34.609
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-2.192	0.000			
• Program Adjustments	0.000	0.000	-34.258	-	-34.258
• Rate/Misc Adjustments	0.000	0.000	-0.351	-	-0.351
• Congressional Directed Reductions Adjustments	-3.100	-	-	-	-
• Congressional Add Adjustments	40.000	-	-	-	-

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2017	FY 2018
Project: 9999: *Congressional Adds*		
Congressional Add: *Autonomous Surface Unmanned Vehicle Research*	38.686	0.000
Congressional Add Subtotals for Project: 9999	38.686	0.000
Congressional Add Totals for all Projects	38.686	0.000

Change Summary Explanation

Technical: Not applicable.

Schedule: Not applicable.

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy			Date: February 2018
Appropriation/Budget Activity 1319 / 3	R-1 Program Element (Number/Name) PE 0603123N / *Force Protection Advanced Technology*	Project (Number/Name) 2912 / *Force Protection Advanced Technology*	

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
2912: *Force Protection Advanced Technology*	0.000	41.810	23.568	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	65.378

Note

The funding decrease from FY18 to FY19 reflects the realignment and consolidation of resources from the current Program Element (PE) and Project 2912 into the new FY19 Navy Advanced Technology Development (ATD) PE 0603671N, and the Navy Advanced Technology Project 3433. Specific efforts transferred from this PE include all planned continuing and initiating research associated with the Surface Ship & Submarine Hull Mechanical & Electrical (HM&E), and Aircraft Technology research efforts.

A. Mission Description and Budget Item Justification

This project addresses advanced technology development associated with providing the capability of Platform and Force Protection for the U.S. Navy. This project supports the development of technologies associated with all naval platforms (surface, subsurface, terrestrial, and air) and the protection of those platforms. For the new FY 2016 effort, Forward Deployed Energy and Communications Outpost (FDECO) INP, the project addresses advanced technology development associated with providing the undersea energy and communications infrastructure necessary to assure undersea dominance; extend the reach of undersea assets; enhance situational awareness (SA) and standoff advantage without reducing forward presence and; provide endurance for unmanned systems necessary for force multiplication in an anti-access/area denial (A2/AD) environment. For the new FY 2016 effort, Medium Displacement Unmanned Surface Vehicle (MDUSV), the project will radically change the way the Navy does mine influence sweep, anti-submarine warfare (ASW) and electronic warfare (EW) missions; it will introduce larger unmanned surface vehicles (USV) to the Navy; and it will introduce advanced autonomy to the surface Navy.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: SURFACE SHIP & SUBMARINE HULL MECHANICAL & ELECTRICAL (HM&E)	13.283	17.546	0.000	0.000	0.000
Description: Activity includes: advanced technology demonstrations to evaluate emerging energy technologies and advanced technology development for Unmanned Sea Surface Vehicles (USSV) in support of Naval S&T Focus Area on Autonomy and Unmanned Vehicles. ***FY 2018 Plans:*** -Conduct advanced research related to critical S&T for development of autonomous navigation for USVs from host ship. -Expand research for conducting advanced technology demonstrations to evaluate emerging energy technologies using Navy and Marine Corps facilities as test beds and evolving the MDUSV effort to demonstrate					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603123N / *Force Protection Advanced Technology*	**Project (Number/Name)** 2912 / *Force Protection Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
the operational benefit of a highly autonomous, large USV with a modular payload capability and demonstrate at-sea three modular payloads. -Initiate efforts to fund a prototype and operational demonstration of At-Sea Rearm of Vertical Launch System (VLS) capability in a relevant environment. ***FY 2019 Base Plans:*** N/A ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** The funding decrease from FY 2018 to FY 2019 reflects the realignment of the funding for Surface Ship & Submarine Hull Mechanical & Electric (HME) to PE 0603671N Navy Advanced Technology Development.					
Title: AIRCRAFT TECHNOLOGY	28.527	6.022	0.000	0.000	0.000
Description: The Aircraft Technology activity develops technologies for enhanced capability of Naval aviation aircraft platforms in terms of mission effectiveness, platform range, responsiveness, survivability, observability, readiness, safety and life cycle cost. It also develops new Naval air vehicle concepts and high impact, scalable Naval air vehicle technologies, such as - autonomous air vehicle command and control, helicopter and tiltrotor rotor drive systems, aerodynamics, propulsion systems, materials, structures and flight controls for future and legacy air vehicles. This activity directly supports the Naval Aviation Enterprise Science and Technology Objectives and the Naval Science and Technology Strategic Plan, principally in the Autonomy and Unmanned Systems, Platform Design and Survivability, Power and Energy and Total Ownership Cost Focus Areas. ***FY 2018 Plans:*** - Continue the advanced technology development efforts and demonstrations of the VCAT Program. Critical technology development efforts continue with major engine manufactures and system contractors to develop/ mature the highest priority, long lead propulsion system technologies, including variable/adaptive cycle engine components, for next generation carrier based TACAIR ISR systems. ***FY 2019 Base Plans:*** N/A ***FY 2019 OCO Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603123N / *Force Protection Advanced Technology*	**Project (Number/Name)** 2912 / *Force Protection Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** The funding decrease from FY 2018 to FY 2019 reflects the realignment of the funding for Aircraft Technology to PE 0603671N Navy Advanced Technology Development.					
Accomplishments/Planned Programs Subtotals	41.810	23.568	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

The overall goals of this advanced technology program are the development of technologies which focus on the warfighter and providing the ability to win or avoid engagements with other platforms or weapons and, in the event of engagement, to resist and control damage, while preserving operational capability. Overall metric goals are to transition the advanced technology projects into acquisition programs. Each Activity within this PE has unique goals and metrics, some of which include classified quantitative measurements. Specific examples of metrics under this PE include: - Advanced technology demonstrations to evaluate emerging energy technologies.

For the FDECO INP effort, the overall goals is the development of technologies which focus on energy management and transfer technologies that enable persistent undersea operations by unmanned vehicle (UxV) Fleet; provide system architectures that are persistent, scalable and mission agile; provide communication and energy infrastructure available in degraded and contested environments and; provide a platform-agnostic solution that reduces development and maintenance costs. Overall metric goals are to transition the key advanced technology elements, Forward Deployed Energy (FDE), Forward Deployed Communications (FDC) and Forward Deployed Docking (FDD) into acquisition programs. Each Activity within this PE has unique goals and metrics, some of which include classified quantitative measurements. Specific examples of metrics include: - Advanced technology demonstrations to evaluate energy and data transmission and persistent connectivity.

Medium Displacement Unmanned Surface Vehicle (MDUSV), the objectives are to 1) Demonstrate, using specific payloads, the multi-mission versatility of MDUSV, and identify key interface requirements for future payloads. 2) Provide a robust assessment of MDUSV's collision regulations (COLREGs) autonomy to build confidence in the reliability and safety of the autonomous control system and 3) Enable the evaluation of MDUSV's operational utility and design to support an acquisition transition decision.

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy											Date: February 2018	
Appropriation/Budget Activity 1319 / 3					R-1 Program Element (Number/Name) PE 0603123N / *Force Protection Advanced Technology*				Project (Number/Name) 3049 / *Force Protection*			
COST ($ in Millions)	**Prior Years**	**FY 2017**	**FY 2018**	**FY 2019 Base**	**FY 2019 OCO**	**FY 2019 Total**	**FY 2020**	**FY 2021**	**FY 2022**	**FY 2023**	**Cost To Complete**	**Total Cost**
3049: *Force Protection*	0.000	2.650	2.774	2.423	-	2.423	2.447	2.503	2.518	2.561	Continuing	Continuing

A. Mission Description and Budget Item Justification

Develop advanced technologies, critical to protecting naval installations, to provide seamless full spectrum protection against asymmetric attack by improving the ability to: detect and identify developing and immediate threats; shape our responses through improved situational awareness and decision making; shield personnel, mission critical facilities, infrastructure, and operating fleet assets; maintain essential functions; and sustain and restore critical services in the aftermath of an incident. Technologies developed will also seek to reduce the required manpower and skill levels devoted to the force protection mission.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: EMERGING THREATS	2.650	2.774	2.423	0.000	2.423
Description: This activity includes development of advanced technologies critical to protecting naval installations, and will provide seamless, full spectrum protection against asymmetric terrorist attack by improving the ability to: sense developing and immediate threats; shape our responses through improved situational awareness and decision making; shield personnel, mission critical facilities, infrastructure, and operating fleet assets; maintain essential functions; and sustain and restore critical services in the aftermath of an incident. Technologies developed will also seek to reduce the required manpower and skill levels devoted to the force protection mission. ***FY 2018 Plans:*** - Continue development of lower cost/higher performance Force Protection sensors and automated detection algorithms, and decision support tools. - Continue research to reduce force protection manpower and equipment costs through automation and predictive learning algorithms. -Continue threat characterization research and perception experiments for sensor performance optimization and model development and validation. - Continue development of all weather sensors optimized for installation of force protection. - Continue research into sensors for use in counter-surveillance around protected facilities. - Continue research to advance sensor fusion capabilities in high density networks with diverse sensor grids.					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603123N / *Force Protection Advanced Technology*	**Project (Number/Name)** 3049 / *Force Protection*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
- Continue development of assessment algorithms and information analysis technologies to augment skills or replace persons in operations centers. - Continue interim demonstration of acoustic sensors for perimeter and area surveillance in realistic environments. - Continue development of protection technology for naval installation power and energy infrastructure. - Continue research in non-acoustic detection, tracking, classification, engagement of underwater threats to naval installations. - Continue development of autonomous unmanned harbor defense systems for perimeter patrol and threat interdiction. - Continue research into automated vehicle entry control point monitoring, automatic vehicle classification, risk assessment and logic system decision making. - Continue development of non-contact biometric verification technologies to support unmanned automated access control systems. - Continue and expand development of Virtual Inductive Loop technology to include pedestrians, two wheeled vehicles, and multi-lane automated gates - Complete development and demonstration of electro-optic sensors and fusion algorithms for installation surveillance in adverse weather conditions. - Complete development and conduct demonstration of sensors and countermeasures for use against underwater threats to include surface swimmers, underwater divers, diver propulsion aids, and underwater unmanned vehicles.					
FY 2019 Base Plans: Finish development and conduct full demonstration of Virtual Inductive Loop technology to include automated perimeter surveillance in the region of the entry control point. Replacing in ground inductive loops with video based virtual inductive loops will improve reliability and performance and reduce maintenance costs associated with Naval Facilities Engineering Command (NAVFAC) automated gates.					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603123N / *Force Protection Advanced Technology*	**Project (Number/Name)** 3049 / *Force Protection*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Ongoing development of Autonomous Maritime Asset Protection capabilities for detection, classification, and defeat of small unmanned air, surface, and subsurface threats to naval installations through fusion of electro-optic sensors, acoustic sensors and countermeasures technologies demonstrated under this program. ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** The decrease in funding and reduced program costs from FY2018 to FY2019 is associated with the completion of the Virtual Inductive Loop technology effort.					
Accomplishments/Planned Programs Subtotals	2.650	2.774	2.423	0.000	2.423

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

The overall goal of this program is to develop technologies which will provide protection for our naval installations against asymmetric attack. Specific metrics include: a 50% reduction of manpower required to perform force protection surveillance, situational awareness, and decision making, a 2x improvement in electro-optical sensor performance in adverse weather conditions, a 50% reduction in sensor cost per square or cubic meter of detection at a given resolution, and a 50% reduction in false alarm rates for automated detection and tracking algorithms both on, above and below water.

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy			Date: February 2018
Appropriation/Budget Activity 1319 / 3	R-1 Program Element (Number/Name) PE 0603123N / *Force Protection Advanced Technology*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
9999: *Congressional Adds*	0.000	38.686	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	38.686

A. Mission Description and Budget Item Justification

Congressional Interest Items not included in other Projects.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018
Congressional Add: Autonomous Surface Unmanned Vehicle Research	38.686	0.000
FY 2017 Accomplishments: Funds executed to further research and support for Autonomous Surface Unmanned Vehicles, including design and fabrication of a second SEA HUNTER (MDUSV) hull.		
FY 2018 Plans: N/A		
Congressional Adds Subtotals	38.686	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Congressional Interest Items not included in other Projects.