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 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603123N *I Force Protection Advanced Technology*							
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	0.000	28.194	25.831	38.044	-	38.044	49.256	50.299	31.108	16.921	Continuing	Continuing
2912: *Force Protection Advanced Technology*	0.000	25.721	23.207	35.371	-	35.371	46.531	47.525	28.334	14.147	Continuing	Continuing
3049: *Force Protection*	0.000	2.473	2.624	2.673	-	2.673	2.725	2.774	2.774	2.774	Continuing	Continuing

Note

There are two new Leap Ahead initiatives starting in FY 2016 - Forward Deployed Energy & Communications Outpost (FDECO) INP and Medium Displacement Unmanned Surface Vehicle (MDUSV) effort.

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 (Sep 2011). 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 2016 Navy					Date: February 2015
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 2014**	**FY 2015**	**FY 2016 Base**	**FY 2016 OCO**	**FY 2016 Total**
Previous President's Budget	28.286	25.831	34.938	-	34.938
Current President's Budget	28.194	25.831	38.044	-	38.044
Total Adjustments	-0.092	-	3.106	-	3.106
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.092	-			
• Program Adjustments	-	-	3.106	-	3.106

Change Summary Explanation

Technical: Not applicable.

Schedule: Not applicable.

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy			Date: February 2015
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 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
2912: *Force Protection Advanced Technology*	-	25.721	23.207	35.371	-	35.371	46.531	47.525	28.334	14.147	Continuing	Continuing

Note

There are two new Leap Ahead initiatives starting in FY 2016 - Forward Deployed Energy & Communications Outpost (FDECO) INP and Medium Displacement Unmanned Surface Vehicle (MDUSV) effort.

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 SA and standoff advantage without reducing forward presence and; provide endurance for unmanned systems necessary for force multiplication in an 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, ASW and EW missions; it will introduce larger USVs to the Navy; and it will introduce advanced autonomy to the surface Navy.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
Title: SURFACE SHIP & SUBMARINE HULL MECHANICAL & ELECTRICAL (HM&E)	6.821	8.656	13.743	-	13.743
Description: Activity includes: advanced technology demonstrations to evaluate emerging energy technologies and advanced technology development for Unmanned Sea Surface Vehicles. The funding increase from FY 2014 to FY 2015 is due the ramping up of the Energy Systems Technology Evaluation Program (E-STEP) effort. The funding increase from FY 2015 to FY 2016 is due to the initiation of the Medium Displacement Unmanned Surface Vehicle (MDUSV) Leap Ahead effort. The increase from FY 2015 to FY 2016 is also due to the fact the FDECO program initiates fully from a study of distributed, open, adaptable, and scalable architectures suitable to future Naval demands. To full scale INP Project to transition the key advanced technology elements, Forward Deployed Energy (FDE), Forward Deployed Communications (FDC) and Forward Deployed Docking (FDD) into acquisition programs.					

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy		Date: February 2015
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 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
FY 2014 Accomplishments: - Continued development of autonomous navigation for Unmanned Sea Surface Vehicles from a host ship - Continued efforts to conduct advanced technology demonstrations to evaluate emerging energy technologies using Navy and Marine Corps facilities as test beds. ***FY 2015 Plans:*** - Continue all efforts of FY 2014. - Initiate FDECO Architecture Planning Study to analyze distributed, open, adaptable, and scalable architectures suitable to future Naval demands. ***FY 2016 Base Plans:*** - Continue all efforts of FY 2015. - Initiate the FDECO INP project. - Initiate Medium Displacement Unmanned Surface Vessel (MDUSV) effort to demonstrate the operational benefit of a highly autonomous, large USV with a modular payload capability and demonstrate at-sea three modular payloads. The activity will consist of advancements to autonomous control, payload integration, and at-sea demonstration of vessel autonomous control and payloads supporting mine warfare, anti-submarine warfare and electronic warfare. ***FY 2016 OCO Plans:*** N/A					
Title: AIRCRAFT TECHNOLOGY ***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. The funding decrease in FY 2015 is due to a re-scoping of the 6.3 portion of the Variable Cycle Advanced Technology (VCAT) program.	18.900	14.551	21.628	-	21.628

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy		Date: February 2015
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 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
The funding increase from FY 2015 to FY 2016 is due to the initiation of the joint Tern program. ***FY 2014 Accomplishments:*** - Continued demonstration of initial core software, sensor, air vehicle, and capability applications for Autonomous Aerial Cargo/Utility System (AACUS). - Continued the advanced technology demonstration portion of the Variable Cycle Advanced Technology (VCAT) Program. Critical technology development efforts will begin 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. - Demonstrated initial core software, sensor, air vehicle, and capability applications for Autonomous Aerial Cargo/Utility System (AACUS). - Completed the majority of VCAT Phase I variable cycle engine/propulsion subsystem technology development efforts. ***FY 2015 Plans:*** - Continue all efforts of FY 2014, less those noted as completed above. - Demonstrate sensor improvements, capability expansion and technology maturation of the Autonomous Aerial Cargo/Utility System (AACUS). - Continue VCAT Phase I variable cycle engine/propulsion subsystem technology development efforts through completion. ***FY 2016 Base Plans:*** - Continue all efforts of FY 2015. - Initiate the joint Tern program to conduct an at sea demonstration of Vertical Take-Off and Landing (VTOL) enabling technologies in support of DDG-51 and LCS-2 based future long endurance Unmanned Air Vehicle (UAV) capabilities. - Demonstrate portability to another rotary wing aircraft capability expansion and technology maturation of the Autonomous Aerial Cargo/Utility System. ***FY 2016 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	25.721	23.207	35.371	-	35.371

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

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 new FY 2016 effort, Forward Deployed Energy and Communications Outpost (FDECO) INP, the overall goals of this advanced technology program are the development of technologies which focus on energy management and transfer technologies that enable persistent undersea operations by 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 & data transmission and persistent connectivity.

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy											Date: February 2015	
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 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**
3049: *Force Protection*	-	2.473	2.624	2.673	-	2.673	2.725	2.774	2.774	2.774	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 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.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
Title: EMERGING THREATS	2.473	2.624	2.673	-	2.673
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 2014 Accomplishments:*** - Continued development of lower cost/higher performance Force Protection sensors and automated detection algorithms, and decision support tools. - Continued research to reduce force protection manpower and equipment costs through automation and predictive learning algorithms. - Continued threat characterization research and perception experiments for sensor performance optimization and model development and validation. - Continued development of all weather sensors optimized for installation of force protection. - Continued research into sensors for use in counter-surveillance around protected facilities. - Continued research to advance sensor fusion capabilities in high density networks with diverse sensor grids. - Continued development of assessment algorithms and information analysis technologies to augment skills or replace persons in operations centers. - Continued interim demonstration of acoustic sensors for perimeter and area surveillance in realistic environments.					

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy		Date: February 2015
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 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
- Continued multi-band electro-optical sensor and fusion algorithm development and demonstrations in adverse weather conditions. - Continued development of protection technology for naval installation power and energy infrastructure. - Continued expansion of research into sensors and countermeasures for use against unmanned underwater to include surface swimmers, underwater divers, and underwater diver propulsion aids. ***FY 2015 Plans:*** - Continue all efforts of FY 2014. - Continue demonstration of multi-band electro-optical sensors and fusion algorithms in adverse weather conditions. - Initiate demonstration of sensors and countermeasures for use against underwater to include surface swimmers, underwater divers, diver propulsion aids, and underwater unmanned vehicles. - Initiate research in non-acoustic detection, tracking, classification, and engagement of underwater threats to naval installations. - Initiate development of autonomous unmanned harbor defense systems for perimeter patrol and threat interdiction. ***FY 2016 Base Plans:*** - Continue all efforts of FY 2015. - Initiate research into automated vehicle entry control point monitoring, automatic vehicle classification, risk assessment and logic system decision making. - Initiate development of non-contact biometric verification technologies to support unmanned automated access control systems. ***FY 2016 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	2.473	2.624	2.673	-	2.673

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603123N / *Force Protection Advanced Technology*	**Project (Number/Name)** 3049 / *Force Protection*

E. Performance Metrics

The overall goals of this advanced technology program are the development of technologies which will provide seamless full spectrum protection against asymmetric terrorist attack by improving the ability to protect naval installations. Overall metric goals are to reduce the required manpower and skill levels devoted to the force protection mission. Specific metric under the Project includes: 50% reduction of manpower associated with FP surveillance, situational awareness, and decision making, 2x improvement in electro-optical sensor performance in adverse weather conditions, 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 above and below water.