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Exhibit R-2, RDT&E Budget Item Justification: PB 2017 Navy **Date:** February 2016

Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 3: Advanced Technology Development (ATD)</i>					R-1 Program Element (Number/Name) PE 0603758N / <i>Navy Warfighting Exp & Demo</i>							
COST (\$ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
Total Program Element	0.000	55.363	65.946	60.550	-	60.550	84.122	93.270	117.192	154.271	Continuing	Continuing
2918: <i>Navy Warfighting Experiments and Demo</i>	0.000	55.363	65.946	60.550	-	60.550	84.122	93.270	117.192	154.271	Continuing	Continuing

A. Mission Description and Budget Item Justification

This Program Element (PE) addresses the development of recent technology breakthroughs to meet current operational needs from a subscale proof-of-principle into a full-scale prototype for warfighter experimentation during laboratory and operational demonstrations, Fleet Battle Experiments (FBE), Limited Objective Experiments (LOEs) and sea trial exercises. The key aspects of this PE are divided into four areas: (1) SwampWorks develops and demonstrates newly invented or recently discovered technologies that address emergent and enduring operational problems in an accelerated timeframe; (2) Naval Warfare Experimentation develops rapid prototypes and provides them to the warfighter for experimentation during laboratory and operational demonstrations; (3) TechSolutions develops rapid response science and technology prototypes addressing Fleet/Force needs identified by Sailors and Marines at the deckplate level; (4) Operations Analysis provides the Navy and Marine Corps the means to identify capability needs that can be addressed with science and technology solutions, and (5) Manufacturing Technology Science and Technology (S&T) to accelerate recently discovered manufacturing technologies to reduce the acquisition and ownership costs of current and future platforms.

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

Funding increased in FY2016 in order to accommodate increased Naval Warfare Experimentation to support emergent opportunities to meet fleet needs with potential technology solutions and SwampWorks due to the increased research and fleet interest in the areas of Autonomy, Electromagnetic Warfare and the exploitation of unmanned systems.

Note: For Manufacturing Technology S&T, the funds in FY2016 (\$7.495M) and beyond have moved to new PE 0603680N Manufacturing Technology Program.

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B. Program Change Summary (\$ in Millions)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Previous President's Budget	53.876	66.041	61.995	-	61.995
Current President's Budget	55.363	65.946	60.550	-	60.550
Total Adjustments	1.487	-0.095	-1.445	-	-1.445
• Congressional General Reductions	-	-0.095			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	2.303	0.000			
• SBIR/STTR Transfer	-0.816	0.000			
• Program Adjustments	0.000	0.000	-0.118	-	-0.118
• Rate/Misc Adjustments	0.000	0.000	-1.327	-	-1.327

Change Summary Explanation

Technical: Not applicable.

Schedule: Not applicable.

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Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy										Date: February 2016		
Appropriation/Budget Activity 1319 / 3					R-1 Program Element (Number/Name) PE 0603758N / Navy Warfighting Exp & Demo				Project (Number/Name) 2918 / Navy Warfighting Experiments and Demo			
COST (\$ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
2918: Navy Warfighting Experiments and Demo	0.000	55.363	65.946	60.550	-	60.550	84.122	93.270	117.192	154.271	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project focuses on the development of recent technology breakthroughs to meet current operational needs from a subscale proof-of-principle into a full-scale prototype for warfighter experimentation during laboratory and operational demonstrations, Fleet Battle Experiments (FBEs), Limited Objective Experiments (LOEs) and sea trial exercises.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Title: ONR EXPERIMENTATION	20.571	21.688	22.352	0.000	22.352
Description: The objective of this project is to capitalize on recent technology breakthroughs to integrate components and subsystems into prototypes for field experiments and/or tests in simulated or actual environments. The use of Navy Warfare Development Command (NWDC) Fleet Experimentation (FLEX) events is encouraged and the net results are to gain the knowledge that only an experiment can provide.					
Funding increase in FY2016 will support emergent opportunities to meet fleet needs with potential technology solutions including demonstrations and experimentation with Directed Energy and High Energy Laser Weapons Systems.					
FY 2015 Accomplishments:					
- Continued concept based technology program efforts.					
- Continued experimentation efforts with technologies developed in SwampWorks/TechSolutions.					
- Continued to identify promising technology breakthroughs that can be prototyped and delivered to the warfighter for experimentation.					
- Continued development and demonstration of real time situational awareness technologies such as battlespace enhanced mixed reality.					
- Continued technology experimentation for Total Ownership Cost (TOC) reduction such as the advanced aircraft top coats and topside corrosion control.					
- Continued efforts to develop, demonstrate and experiment with technologies to meet current or emerging operational needs.					
- Initiated demonstrations and experimentation with Directed Energy (DE) and High Energy Laser (HEL) advanced weapons systems.					

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
<p>- Successfully conducted an experiment to demonstrate unmanned surface vehicle swarming technologies in collaboration with the warfighter, laboratories and operational forces.</p> <p>FY 2016 Plans:</p> <ul style="list-style-type: none"> - Continue all efforts of FY2015 unless noted as completed above. - Demonstrate unmanned air vehicle swarming technologies in collaboration with the warfighter, laboratories and operational forces. <p>FY 2017 Base Plans:</p> <ul style="list-style-type: none"> - Continue all efforts of FY2016 unless noted as completed above. - Initiate experimentation initiatives to support high impact Fleet efforts - Leverage fleet experimentation venues in order to optimize development efforts and gain greater fleet/force feedback of developing technologies. <p>FY 2017 OCO Plans: N/A</p>					
<p>Title: OPERATIONS ANALYSIS</p> <p>Description: The objective of this project is to provide operational analysis through studies, analyses, gaming and experimentation to identify Navy and Marine Corps capability needs that can be addressed with S&T solutions. The effort includes core analysis of S&T programs, military utility/capability gaps analyses, war gaming, structured experimentation events, the articulation of the results of that analysis and wargaming, and the development of innovation strategies and messages resulting from these analyses. Recent work includes participation in SIMEX design, data collection and analysis events; wargame design in support of the ONR Office of Technology; analytical, strategic planning, and wargaming support; organizing and conducting workshops and symposia that increase innovation outreach; and participating in Red Teaming and conceptual analysis.</p> <p>Funding increase in FY2017 will accommodate increased efforts needed to support increased experimentation planning and execution and robust concept development efforts in support of the Innovative Naval Prototyping program.</p> <p>FY 2015 Accomplishments:</p> <ul style="list-style-type: none"> - Continued to conduct Military Utility Analyses of Future Naval Capability technologies. - Continued to conduct capability gaps analyses to identify areas that can be addressed with products from the S&T portfolio. 	1.746	2.178	3.112	0.000	3.112

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
<p>- Continued to conduct SIMEX development, execution, data collection and analysis.</p> <p>- Continued to conduct war-game design in support of the ONR Office of Technology.</p> <p>- Successfully conducted a war-game to identify capability needs for the NEMESIS Innovative Naval Prototype, operational personnel participated to ensure S&T solutions were focused on capabilities needed in electronic warfare.</p> <p>FY 2016 Plans:</p> <p>- Continue all efforts of FY2015 unless noted as completed above.</p> <p>- Conduct a war-game to identify capability needs for the medium displacement unmanned surface vehicle, utilize operational personnel to ensure S&T solutions are focused on capabilities needed for unmanned systems.</p> <p>FY 2017 Base Plans:</p> <p>- Continue all efforts of FY2016 unless noted as completed above.</p> <p>- Initiate new efforts in support of Fleet/Force.</p> <p>FY 2017 OCO Plans: N/A</p>					
<p>Title: SWAMPWORKS</p> <p>Description: SwampWorks seeks to develop and demonstrate technologies that address emergent and enduring operational problems in an accelerated timeframe. The general nature of these efforts are high risk/high reward and constitute a leap ahead in capability or technology. Some of these technologies may become part of a follow-on technology development, may end up in the hands of the warfighter for Fleet/Force experimentation, or may culminate in a significant Fleet/Force exercise that demonstrates capability then transitions into the Acquisition Program of Record (POR).</p> <p>Funding increase in FY2016 is due to the increased research in Directed Energy (Solid State Laser - Technology Maturation, or SSL-TM). This investment was a single year investment and thus the decrease from FY2016 to FY2017.</p> <p>FY 2015 Accomplishments:</p> <p>- Continued to identify enduring and emergent operational barriers identified by naval leadership and responded with relevant technology developments and demonstrations.</p> <p>- Continued disruptive commercial technology studies at varied military, government, and educational institutions.</p>	22.004	32.064	25.086	0.000	25.086

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
<ul style="list-style-type: none"> - Continued high risk/high payoff projects to explore significant leap-ahead capabilities. - Continued efforts to develop technologies to meet current or emerging operational needs. - Continued investment in submarine control surface technologies. - Continued investment in advanced electronic warfare technologies; projects are expected to be classified at a higher level. - Continued efforts to develop and demonstrate technologies to meet current or emerging operational needs to include vision enhancement, electronic warfare, diving technologies. - Continued efforts that develop and/or demonstrate advanced technologies in support of Fleet issue in an accelerated timeframe. <p>FY 2016 Plans:</p> <ul style="list-style-type: none"> - Continue all efforts of FY2015 unless noted as completed above. - Initiate additional projects in the area of Autonomy, Electromagnetic Warfare and exploitation of unmanned systems - Pursue emergent technology opportunities to support high impact pacific pivot efforts. <p>FY 2017 Base Plans:</p> <ul style="list-style-type: none"> - Continue all efforts of FY2016 unless noted as completed above. <p>FY 2017 OCO Plans: N/A</p>					
<p>Title: TECH SOLUTIONS</p> <p>Description: TechSolutions develops rapid response Science and Technology (S&T) solutions to immediate Fleet/Force needs identified by individual warfighters at the deckplate level. Sailors, Marines and Science Advisors submit their issues throughout the year via the TechSolutions website, email, phone, or chain of command. Projects are initiated as requests are received and are completed in approximately twelve to eighteen months, resulting in a prototype demonstration of TRL 6 or higher.</p> <p>FY 2015 Accomplishments:</p> <ul style="list-style-type: none"> - Completed CVN 360 degree Surveillance System providing improved EO/IR situational awareness of the local area to CVN personnel and Virginia class Diesel Generator 3D Trainer - Continued development of projects that provide solutions to problems identified by Science Advisors and the Fleet/Force to address emergent critical needs. 	9.056	10.016	10.000	0.000	10.000

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
<p>- Rapidly responded to the needs of our warfighters. Some examples include a Submarine Electronic Sonar Tacaaid that automates dated procedures that utilize mechanical devices, beyond the line of sight control for the UAS Scan Eagle, and a low light aiming system for the 60mm lightweight mortar</p> <p>FY 2016 Plans:</p> <ul style="list-style-type: none"> - Continue all efforts of FY2015 unless noted as completed above. - Continue development of projects that will provide solutions to address emergent critical needs. - Develop, demonstrate and deliver technical solution prototypes to projects initiated in the previous fiscal year. <p>FY 2017 Base Plans:</p> <ul style="list-style-type: none"> - Continue all efforts of FY2016 unless noted as completed above. - Initiate rapid response S&T projects in direct support of Fleet/Force needs. <p>FY 2017 OCO Plans: N/A</p>					
<p>Title: MANUFACTURING TECHNOLOGY S&T</p> <p>Description: The Manufacturing Technology S&T program accelerates recently discovered manufacturing technologies to reduce the acquisition and ownership costs of current and future platforms which assists in meeting performance and platform affordability goals - both acquisition and life-cycle. This supports a critical goal of the Navy, meeting the affordability goals of major acquisition platforms, by accelerating emerging manufacturing technology.</p> <p>The funds in FY2016 (\$7.495M) and beyond have moved to new PE 0603680N Manufacturing Technology Program. The funding has been distributed to R2 activities within that PE as follows: \$1.200 Composites Processing and Fabrication, \$0.957M to Electronics Processing and Fabrication, \$5.338M to Manufacturing Enterprise/Other.</p> <p>FY 2015 Accomplishments:</p> <ul style="list-style-type: none"> - Continued/accelerated recently discovered manufacturing technologies to reduce the acquisition and ownership costs of current and future platforms. <p>FY 2016 Plans:</p> <ul style="list-style-type: none"> - Funds moved to new PE 0603680N Manufacturing Technology Program. 	1.986	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
The funding has been distributed to R2 activities within that PE as follows: \$1.200M Composites Processing and Fabrication, \$0.957M to Electronics Processing and Fabrication, \$5.338M to Manufacturing Enterprise/Other. FY 2017 Base Plans: N/A FY 2017 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	55.363	65.946	60.550	0.000	60.550

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

Not applicable.

E. Performance Metrics

Overall metric goals are to transition the 6.3 advanced technology projects into acquisition programs of record, demonstrate successful technologies to enable new operational concepts, and enable the production of technology products such as proofs of concept and manufacturing packages. The performance of the work funded in this PE is reviewed at several levels to ensure that the investment is relevant and productive. At the macroscopic level, the investment is coordinated with Navy Warfare Development Command and Commander, Fleet Forces Command to address the goals and objectives identified for sea trials and Limited Objective Experiments (LOEs). At the microscopic level, the work funded in this PE is reviewed periodically by the Program Manager to ensure the investment is meeting the goals defined for each project. This review includes feedback collected from the warfighter community on all sea trials and LOEs to support the Program Manager's assessment of the value and relevance of each investment. Furthermore, the entire program is reviewed yearly by the Chief of Naval Research.