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Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Navy										Date: March 2014		
Appropriation/Budget Activity 1319: Research, Development, Test & Evaluation, Navy I BA 2: Applied Research					R-1 Program Element (Number/Name) PE 0602236N I Warfighter Sustainment Applied Res							
COST (\$ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
Total Program Element	0.000	40.162	49.688	46.923	-	46.923	44.755	46.178	46.980	47.077	Continuing	Continuing
0000: Warfighter Sustainment Applied Res	0.000	40.162	49.688	46.923	-	46.923	44.755	46.178	46.980	47.077	Continuing	Continuing

The FY 2015 OCO Request will be submitted at a later date.

Note
FY 2013 funding associated with Future Naval Capability (FNC) efforts are transferring to a new Program Element titled Future Naval Capabilities Applied Research (PE 0602750N). This is to enhance the visibility of the FNC Program by providing an easily navigable overview of all 6.2 FNC investments in a single location.

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 supports innovation-based efforts that will provide technology options for future Navy and Marine Corps capabilities. Efforts focus on advanced Naval materials; biocentric technologies; environmental quality; human factors and organizational design; medical technologies; and Naval training technologies. Within the Naval Transformation Roadmap, this investment maps to future transformational capabilities and the FORCEnet pillar of the Chief of Naval Operations and the Commandant of the Marine Corps vision for the future -- Naval Power 21.

The ONRG International Science Program mission is to search the globe for emerging scientific research and advanced technologies to enable the Office of Naval Research (ONR) and the NRE to address effectively the current needs of the Fleet/Forces, and investigate and assess revolutionary, high-payoff technologies for future Naval missions and capabilities. Within this Global mission, funding for the Naval Science Advisor Program ensures the Fleet/Force (F/F) helps shape the Department of the Navy (DoN) investment in Science and Technology (S&T), develops teaming relationships to rapidly demonstrate and transition technology, supports development of technology-based capability options for naval forces, and enables warfighting innovations based on technical and conceptual possibilities. Science Advisors provide insight into issues associated with Naval Warfighting Capabilities that influence S&T program decision making. The program develops leaders among civilian scientists and engineers in the Naval Research Enterprise (NRE). Upon completion of their tours, Science Advisors return to the NRE with first hand knowledge of the F/F, warfighting issues, and strategic decision making. The Office of Naval Research (ONR) Science Advisor program enables continuous communication and collaboration between the warfighters, the technical community, and strategic development commands.

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Due to the number of efforts in this PE, the programs described herein are representative of the work included in this PE.					
B. Program Change Summary (\$ in Millions)	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO	FY 2015 Total
Previous President's Budget	44.127	49.689	48.950	-	48.950
Current President's Budget	40.162	49.688	46.923	-	46.923
Total Adjustments	-3.965	-0.001	-2.027	-	-2.027
• Congressional General Reductions	-	-0.001			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.246	-			
• Program Adjustments	-	-	-2.012	-	-2.012
• Rate/Misc Adjustments	-	-	-0.015	-	-0.015
• Congressional General Reductions Adjustments	-3.719	-	-	-	-
Change Summary Explanation					
Technical: Not applicable.					
Schedule: Not applicable.					

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Exhibit R-2A, RDT&E Project Justification: PB 2015 Navy										Date: March 2014		
Appropriation/Budget Activity 1319 / 2					R-1 Program Element (Number/Name) PE 0602236N / Warfighter Sustainment Applied Res				Project (Number/Name) 0000 / Warfighter Sustainment Applied Res			
COST (\$ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
0000: Warfighter Sustainment Applied Res	-	40.162	49.688	46.923	-	46.923	44.755	46.178	46.980	47.077	Continuing	Continuing
# The FY 2015 OCO Request will be submitted at a later date.												
A. Mission Description and Budget Item Justification												
This PE supports the FNCs of Littoral Combat/Power Projection, Capable Manpower, Force Health Protection Future Capability, Enterprise and Platform Enablers (EPE) FNC; and innovation-based efforts that will provide technology options for future Navy and Marine Corps capabilities. Efforts focus on manpower and personnel; Naval systems training and education; human systems integration; littoral combat and power projection capabilities; advanced naval materials; medical technologies; environmental quality; biocentric technologies; high speed sealift; cost reduction technologies; and Sea Basing technologies. Within the Naval Transformation Roadmap, this investment supports eight transformational capabilities within the "Sea Strike", "Sea Shield", and "Sea Basing" operational concepts; the critical human system, "Sea Warrior"; and Naval business efficiencies within "Sea Enterprise."												
Due to the number of efforts in this PE, the programs described herein are representative of the work included in this PE.												
B. Accomplishments/Planned Programs (\$ in Millions)									FY 2013	FY 2014	FY 2015	
Title: ADVANCED NAVAL MATERIALS									21.182	10.737	9.680	
Description: Advanced Naval Materials efforts include: developing advanced, high-performance materials; developing processes to reduce weight and cost; and developing enhanced sonar transducers.												
The Office of Naval Research Global (ONRG) has a presence overseas, and a mission to search the globe for promising, emerging scientific research and advanced technologies to enable the Office of Naval Research to effectively address current needs of the Fleet and Force. This includes discovering the best science, such as innovative fundamental research which could help shape future naval investments and strategies, and leveraging great minds globally with positive engagement to support the Sailors & Marines of today and tomorrow.												
The decrease of funding from FY 2013 to FY 2014 is due to the consolidation of international research efforts into a new R2 activity within this PE entitled ONR Global. This new R2 activity provides greater visibility for Naval international collaboration and research efforts.												
The decrease of funding from FY 2014 to FY 2015 is due to a ramping down of the effort for Light Weight Ballistic Protection for Maritime Security Forces.												

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2013	FY 2014
<i>FY 2013 Accomplishments:</i> - Continued multi-laser-processing technique development for the fabrication of ultra hard materials for wear resistance applications. - Continued development of advanced, cost-efficient joining of titanium for >25% weight reduction of large seaborne structures. - Continued development of acceptance testing methodologies for advanced transducer, single-crystal, high-strain materials and definition of standardized materials properties and composition ranges. - Continued development of compositional tuning of single-crystal, high-strain transducer materials, for specialized naval system applications. - Continued development of cavitation resistant ship rudder coatings based on the FY 2004 shipboard coating study. - Continued marine titanium alloy design and processing development, exploiting anticipated cost reductions for high performance, reduced maintenance naval applications. - Continued development of continuous, single wall, carbon nanotube composite materials for next generation air and naval platforms. - Continued stainless steel carburization study to enhance corrosion performance. - Continued development of surface preparation methods and characterization of corrosion performance for future naval ship materials. - Continued evaluation of low temperature, carburized materials for marine application. - Continued development of coating performance and knowledge database for Naval use. - Continued development of mechanistic model for stress corrosion cracking in Nickel Aluminum Bronze (NAB). - Continued development of innovative sonar transducers based on high-strain, high-coupling, piezoelectric single crystals. - Continued development of integrated structural composites with blast resistance, manufacturing technologies, and low-cost organic resins with improved fire resistance. - Continued development of novel processing technologies for increasing the fatigue strength and corrosion resistance of weldments for ship structures with reduced weight and maintenance requirements. - Continued development of models and characterization methods for dynamic loading (water slamming and blast loading) in polymer composite materials. - Continued acoustic damping coatings for ship tank application. - Continued development of portable, real-time, Non-Destructive Examination (NDE)/Non-Destructive Inspection (NDI) technology for heat damage detection in composite materials. - Continued development of fiber-optic sensors, transducers and demodulation technology for structural health monitoring of ships and submarines. - Continued development of continuous based monitoring techniques of new synthetic fuels and lubricants based on electromagnetic signature analysis.			

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2013	FY 2014
- Continued development and application of distributed fiber optic Bragg gratings for structural health monitoring of ships and aircrafts. - Continued development of novel growth methods to specialized single crystal transducer materials tuned to requirements of specialized naval systems. - Continued assessment of the degree of sensitization potential of marine grade Al alloys. - Continued investigation of criteria for stable pitting of stainless steel. - Continued development of surface assessment technologies to measure surface profile and chlorine. - Continued evaluation of advanced material coating for erosion control on helicopter main rotor blade leading edges. - Continued development of seamless joining technologies for large, complex shaped conventional ceramic windows from small, inexpensive components using electrophoretic deposition of ceramic nanoparticles. - Continued development of intelligent corrosion sensor systems for intergranular corrosion cracking. - Continued studies on fuel cell corrosion. - Continued development of superhydrophobic surface modification technology. - Continued studies on mitigation of pitting corrosion and stress corrosion cracking in marine aluminum alloys. - Continued development of surface tolerant coating removal methods. - Continued development of processing technologies to fabricate piezoelectric single crystals into complex transducer assemblies. - Continued development of thermal management system(s) to arrest excessive heat fluxes and loads on amphibious ship by advanced Naval/USMC aircraft. - Continued development of MEMS based sensor nodes, with energy harvesting and wireless communication capabilities, for system health management and prognosis. - Continued development of high-strength, high-hardness tool materials for friction-stir welding applications. - Continued development of the rational engineering design of Al-alloys for naval applications. - Continued to lincrease emphasis on research efforts to discover innovative fundamental technologies to shape future Naval investments and strategies, leveraging the globe to support the Sailors & Marines of today and tomorrow. - Continued development of quantitative coasting quality assurance tools. - Completed development of materials processing methods for single crystal piezoelectrics to make strong, robust sonar transducers. - Completed development of advanced composites and polymers with fire resistance for ship structures. - Completed development of nanotube reinforced composite materials for next generation air and naval platforms. - Increased emphasis on research efforts to discover innovative fundamental technologies to shape future Naval investments and strategies, leveraging the globe to support the Sailors & Marines of today and tomorrow. - Initiated study of fluid-structure fynamics for flexible body armor.			

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2013	FY 2014
- Initiated development of mixed metal nanopowder additives for liquid fuels. FY 2014 Plans: - Continue all efforts of FY 2013, less those noted as completed above. - Complete development of seamless joining technologies for large, complex shaped, conventional ceramic windows from small, inexpensive components using electrophoretic deposition of ceramic nanoparticles. - Complete developing techniques for processing of nanostructured aluminum alloys and composites which do not require use of liquid nitrogen. - Complete development of high-strength, high-hardness tool materials for friction-stir welding applications. - Complete development of MEMS based sensor nodes, with energy harvesting and wireless communication capabilities, for system health management and prognosis. - Complete development of portable, real-time, non-destructive examination (NDE)/Non-destructive Inspection (NDI) technology for heat damage detection in composite materials. - Complete development of integrated structural composites with blast resistance, manufacturing technologies, and low-cost organic resins with improved fire resistance. - Complete development of continuous single wall carbon nanotube composite materials for next generation air and naval platforms. - Complete development of energy efficient scalable processing of low cost titanium alloys. - Initiate development of advanced NDE, SHM and Prognostics Technologies for improved readiness and reliability of air and naval platforms based on new and emerging electronic and photonics materials and devices. - Initiate development of advance structural composites with improved mechanical characteristics, blast resistance, and fire resistance, for more durable and reliable structures by optimizing the resin, the fibers and the interphases with new chemistries, additives and processes. - Initiate development and exploitation of new and advanced forms of carbon based nanostructures (Graphene, Nanotubes, Diamond and others) for next generation family of materials and structures with outstanding mechanical, thermal, electrical and energy applications. FY 2015 Plans: - Continue all efforts of FY 2014, less those noted as completed above. - Complete multi-laser-processing technique development for the fabrication of ultra hard materials for wear resistance applications. - Complete development of advanced, cost-efficient joining of titanium for >25% weight reduction of large seaborne structures. - Complete development of cavitation resistant ship rudder coatings based on the FY 2004 shipboard coating study.			
Title: BIOCENTRIC TECHNOLOGIES		6.116	6.470
			6.045

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2013	FY 2014
Description: Biocentric technologies provide novel solutions for naval needs based upon the applications of bio-inspired sensors, materials, processes and systems. Topic areas include, but are not limited to development of biologically-based signal processing for medical, surveillance and security applications; bioinspired robotics; synthetic biology to produce high-value naval materials or to develop sentinel organisms, and marine mammal diagnostics to support the Navy's Fleet Marine Mammal Systems. FY 2013 Accomplishments: Naval Biosciences: - Continued development of innovative naval biosensors, biomaterials, and bioprocess technology. - Continued engineering development and optimization of sea-floor sediment energy harvesting system for sustainable and autonomous powering of underwater sensor networks and AUV's. - Completed efforts on naval biosensor to detect brain structures and blood vessels through skull bones. - Completed studies of production of high-value naval material (e.g., fuels, conducting polymers). - Initiated studies of microbial fuel cells for shoreside or shipboard applications. Synthetic Biology for Sensing & Energy Production: - Continued long duration, realistic field tests, and modeling studies of autonomous microbial fuel cell power systems for underwater sensor networks. - Initiated synthetic biology studies of engineered sentinel organisms for environmental surveillance and production of high-valued naval materials (e.g., fuels, conducting polymers). Life Sciences and Bioengineering: - Continued development of a second set of molecular diagnostic tests for recently discovered viral, bacterial, and fungal pathogens of marine mammals. - Continued marine mammal diagnostics efforts, including immunobioassays for stress and infection detection. - Continued effort to evaluate breath analysis for non-invasive diagnostics in marine mammal medicine. - Continued efforts to engineer plants to produce energetic materials. - Completed studies to evaluate candidate probiotics in Atlantic bottlenose dolphins. - Completed studies of dolphin regenerative cells for treating a variety of pathologies and disease states in these animals. - Initiated microbe derived production of aviation fuel components from renewable wastes. - Initiated efforts to detect, treat, and prevent diseases in dolphins, including diabetes and kidney stones. Neural, Sensory and Biomechanical Systems:			

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2013	FY 2014
- Continued efforts on advanced biomimetic sensing and neural control for human-robot interaction to enable effective collaboration of warfighters and autonomous systems. - Continued integration of biomimetic sonar with bioinspired autonomous undersea vehicles (with high-lift propulsors) to achieve closed loop control. - Continued efforts in bioinspired quiet, and maneuverable self-propelled line array using high-lift propulsors based on animal wing and fin biomechanics. - Continued efforts for bio-inspired massively parallel vision systems. - Completed effort to develop living fluidic networks. - Initiated studies to develop brain-based intelligent systems to support high level interaction between warfighters and autonomous systems. FY 2014 Plans: Naval Biosciences: - Continue all efforts of FY 2013, less those noted as completed above. Synthetic Biology for Sensing & Energy Production: - Continue all efforts of FY 2013. Life Sciences and Bioengineering: - Continue all efforts of FY 2013, less those noted as complete above. - Complete development of a second set of molecular diagnostic tests for recently discovered viral bacterial, and fungal pathogens of marine mammals. Neural, Sensory and Biomechanical Systems: - Continue all efforts of FY 2013, less those noted as completed above. FY 2015 Plans: Naval Biosciences: - Continue all efforts of FY 2014. Synthetic Biology for Sensing & Energy Production: - Continue all efforts of FY 2014. Life Sciences and Bioengineering: - Continue all efforts of FY 2014, less those noted as completed above.			

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2013	FY 2014
- Complete microbe derived production of aviation fuel components from renewable wastes. Neural, Sensory and Biomechanical Systems: - Continue all efforts of FY 2014. - Initiate studies to develop electrosense and biosonar for MOC and EOD missions.			
Title: ENVIRONMENTAL QUALITY Description: Environmental Quality technologies enable sustained world-wide Navy operations in compliance with all local, state, regional, national and international laws, regulations and agreements, and support the Navy Transformational Roadmap in the areas of Sea Basing, Sea Strike and Sea Warrior. Compliant operations enable training evolutions and exercises that are critical for maintaining readiness. FY 2013 Accomplishments: - Continued development of new, advanced, environmentally benign AF/Anti-Corrosive (AC) costing systems for Navy platforms. - Continued development of advanced environmentally sound technologies for shipboard waste treatment and pollution abatement systems. - Continued development and modifications to shipboard oily waste treatment systems to accommodate processing of synthetic lubricants. - Continued field evaluation of prototype robotic Hull BUG to identify gaps needed to refine and advance the technology. - Continued efforts on ballast tank and system design optimization that minimize fuel discharges from compensated systems, minimize sedimentation in clean ballast and compensated ballast tanks, and maximize exchange of organisms during ballast tank exchanges. - Continued efforts on improved handheld, waterborne, underwater hull cleaning technologies. - Continued studies on oil emulsion issues and development of novel bilge water treatment systems on existing and new ships. - Completed development and modifications to shipboard oily waste treatment systems to accommodate processing of sythetic lubricants. FY 2014 Plans: - Continue all efforts of FY 2013, less those noted as completed above. FY 2015 Plans: - Continue all efforts of FY 2014. - Complete efforts on improved handheld, waterborne, underwater hull cleaning technologies.		2.652	2.837
			2.846

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2013	FY 2014
- Complete efforts on ballast tank and system design optimization that minimize fuel discharges from compensated systems, minimize sedimentation in clean ballast and compensated ballast tanks, and maximize exchange of organisms during ballast tank exchanges.			
Title: HUMAN FACTORS AND ORGANIZATIONAL DESIGN		-	5.338
Description: The overarching objective of this activity is the achievement of FORCEnet and Sea Power 21 goals by developing human factors principles and cognitive models for human centric design, decision support systems for collaborative decision making, and adaptive command and control structures. The CNO's new Maritime Strategy and the Commander Fleet Forces Command complementary plan to revise organization of Maritime Operations Centers (MOC) place high priority on the aforementioned FORCEnet and Sea Power 21 goals. Specific objectives focus on improving small team, platform, task force, and battle group operations by developing advanced human factors technologies for incorporation into operational systems. The goals and payoffs are to enhance human performance effectiveness; improve the timeliness and quality of decision making; develop strategies to mitigate high workload and ambiguity; reduce manning; improve situational awareness and speed of command through a deeper understanding of human capabilities and limitations; and improvement of team decision making in ad-hoc, complex problem solving scenarios. The current specific objectives are: a) Human Computer Interaction/Visualization: Develop an understanding of the limitations of human perceptual and attentional systems in relation to maximizing user performance when interacting with complex Naval displays. A combination of computational cognitive modeling and psychological studies are employed to determine the capacity limitations on human performance that will undoubtedly have impact in reduced manning requirements, including information-rich weapons platforms. Develop technology for improving human interaction with autonomous systems and for improving virtual reality systems for training purposes. b) Command Decision Making (CDM): This is a new sub-project that consolidates the previous Collaboration and Knowledge Interoperability (CKI) and Organizational Design and Decision Support Systems sub-projects. The CDM sub-project is focused at the development of dynamic decision support systems that recognize and are responsive to changing mission and task demands, and adapt to present information appropriately. This focus is explicitly intended to deliver decision support that will be more timely and responsive to rapidly evolving operational needs. Current thrusts within the sub-project are to: 1) Conduct research on the application of theory to exploit relevant information for effective decision making; 2) Develop models that are operationally context and task sensitive; 3) Study and apply research for the effective management of highly complex & time critical decision making; 4) Develop and demonstrate decision support tools that address the timely management of risk and uncertainty. c) Social Network Analysis: Develop computational models and algorithms for the analysis of terrorist threats and counter-measures and strategies against terrorist threats. Develop new computational algorithms for the discovery of missing and			5.412

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2013	FY 2014
hidden nodes in complex graphs applicable to the problem of understanding hidden information in terror networks. Develop new approaches to calculation of network completeness. Develop computational approaches to the study of factionalism in social movements using Islamist movements as exemplar data collectivities. The following are non-inclusive examples of accomplishments and plans for projects funded in this activity. This FY 2014 activity funding moves from Program Element 0602235N: Common Picture Applied Research efforts associated with the Human Factors activity and is being transferring into this PE0602236N: Warfighter Sustainment Applied Research to provide an easily navigable overview of all Human Factors investments in a single location. FY 2013 Accomplishments: N/A FY 2014 Plans: Human Computer Interaction/Visualization: - Continue all efforts of FY 2013. - Initiate research on audio-visual cue integration for 360-degree periscope displays. Utilize eye-tracking, sleep studies and traditional behavioral measures to characterize human performance on periscope-related tasks under a variety of physiological conditions. Command Decision Making (CDM): - Continue all efforts of FY 2013 less noted above as complete. - Develop task management algorithms applicable to agile supervisory control of teams involving human and autonomous agents. - Initiate development of information infrastructure that is operational context sensitive to allow the dynamic prioritization of data based on its anticipated information value and mission criticality. Social Network Analysis: - Continue all efforts of FY 2013 less noted above as complete. - Initiate research on socio-technical aspects of community mobilization and complex humanitarian operations, including the use of novel platforms, social networks and the impact of novel technologies on human behavior in crisis and collaborative contexts. FY 2015 Plans: Human Computer Interaction/Visualization: - Continue all efforts of FY 2014. Command Decision Making (CDM):			

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2013	FY 2014
- Continue all efforts of FY 2014. - Initiate research building proactive decision support tools for Command and Control. Social Network Analysis: - Continue all efforts of FY 2014. Hybrid Human Computer Systems: - Initiate research to address visualization and synthesis from multiple data sources to support autonomous systems and small hybrid teams. - Initiate research on human performance sources of cyber vulnerabilities of UxV systems. - Initiate research in human systems integration to reduce workload and increase operator situation awareness in command information center.			
Title: MEDICAL TECHNOLOGIES Description: This program supports the development of field medical equipment, diagnostic capabilities and treatments; technologies to improve warfighter safety and to enhance personnel performance under adverse conditions; and systems to prevent occupational injury and disease in hazardous, deployment environments; including regenerative medicine technologies and therapeutic/restorative practices for the treatment of combat-related traumatic injuries. Navy investment in these areas is essential because Navy/USMC mission needs are not adequately addressed by the civilian sector or other Federal agencies. For example, civilian emergency medicine does not address casualty stabilization during long transit times to definitive care. The National Institutes of Health (NIH) focuses on the basic science of disease processes and not applied research related to development. Programs are coordinated with other Services through the Armed Services Biomedical Research Evaluation and Management (ASBREM) Committee, and Joint Technical Coordinating Group (JTCG) process, to prevent duplication of effort. FY 2013 Accomplishments: Undersea Medicine: - Continued efforts to reduce operational injuries. - Continued efforts to develop prophylactic agents preventing hyperbaric oxygen toxicity. Prolonged exposure to hyperbaric oxygen can be toxic to lungs, nervous system and eyes. - Continued efforts to assess the impact of thermal (i.e., heat and cold) stress on operational performance. Underwater thermal extremes can affect diver performance and alter risk of incurring decompression sickness. - Continued studies related to optimization of diver performance. Operational performance in the undersea environment can be hampered by a variety of environmental stressors.		5.560	5.989
			6.164

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2013	FY 2014
- Continued studies related to optimization of submariner health and performance. Submarine crewmembers are exposed to a variety of unique stressors including prolonged deployments, effects of altered diurnal rhythms, non-standard breathing gases, lack of sunlight, etc that can impact health and performance. Regenerative Medicine: - Continued program, with Army, in regenerative medicine (Armed Forces Institute for Regenerative Medicine (AFIRM)). Noise Induced Hearing Loss: - Continued efforts to reverse NIHL. - Continued studies related to biomedical effects of underwater sound. Military divers must operate safely and effectively in potentially complex underwater sound fields. - Continued efforts for "stress inoculation" to mitigate the impact of exposure to stressful combat environments prior to deployment. - Continued research to study the incidence and susceptibility of Noise Induced Hearing Loss (NIHL) and tinnitus, and to evaluate mitigation strategies. - Continued research in prevention and treatment of NIHL and tinnitus (ringing in the ears). - Continued research to improve personal protective equipment technology. - Continued research to reduce noise at the source, i.e. jet engine quieting and flight deck noise reduction. Noise Induced Hearing Loss-Jet Noise: - Initiated Jet Noise Reduction Project, Noise Induced Hearing Loss Program, to utilize analytical modeling and simulation tools anchored by experiment to develop and assess solutions enabling mitigation of jet induced noise from high performance tactical aircraft. FY 2014 Plans: Undersea Medicine: - Continue all efforts of FY 2013. - Initiate research to explore novel pharmaceutical interventions for hyperbaric oxygen toxicity. Regenerative Medicine: - Continue all efforts of FY 2013. - Complete program, with Army, in regenerative medicine (Armed Forces Institute for Regenerative Medicine (AFIRM)). - Initiate program with Army, in regenerative medicine (Armed Forces Institute for Regenerative Medicine (AFIRM II))			

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2013	FY 2014
Noise Induced Hearing Loss: - Continue all efforts of FY 2013. Noise Induced Hearing Loss-Jet Noise: - Continue all efforts of FY 2013. FY 2015 Plans: Undersea Medicine: - Continue all efforts of FY 2014. - Initiate research on resuscitation therapies for near-drowning victims. Regenerative Medicine: - Continue all efforts of FY 2014, less those noted as completed above. Noise Induced Hearing Loss: - Continue all efforts of FY 2014. Noise Induced Hearing Loss-Jet Noise: - Continue all efforts of FY 2014.			
Title: THE OFFICE OF NAVAL RESEARCH GLOBAL Description: ONR has a presence overseas, with an overarching purpose to search the globe for promising, emerging scientific research and development efforts to address the current needs of the Fleet/Forces, and investigate high-payoff technologies for future naval missions and capabilities. To accomplish this task, ONR capitalizes on global innovation and investment to solve U.S. Navy and Marine Corps science and technology (S&T) challenges, builds global S&T awareness to mitigate risk of potential technological surprise, ensures Fleet/Forces capability needs are communicated to the Naval Research Enterprise (NRE), and facilitates delivery of Naval S&T solutions to the Fleet/Forces. ONR Applied Research (6.2) requirements prior to FY 2014 were funded in another R-2 activity within this PE and also in PE 0602123N and 0206568N. Starting in FY 2014, these requirements have been consolidated into this separate R-2 activity to provide greater visibility for ONR international collaboration and research efforts. The decrease from FY 2014 to FY 2015 is due to reprioritization of requirements. All efforts will continue to the greatest extent possible.		-	13.287
			11.881

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Exhibit R-2A, RDT&E Project Justification: PB 2015 Navy		Date: March 2014	
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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2013	FY 2014
<i>FY 2013 Accomplishments:</i> N/A <i>FY 2014 Plans:</i> International Science Program: The ONR International Science Program mission is to search the globe for emerging scientific research and advanced technologies, to enable the Office of Naval Research (ONR) and the Naval Research Enterprise (NRE) to effectively address current needs of the Fleet/Forces, and investigate and assess revolutionary, high-payoff technologies for future naval missions and capabilities. This is accomplished through PHD-level Associate Director scientists located in Asia, Europe and South America collaborating with international organizations and researchers through grants in innovative applied research, and establishing quality, relevant connections between international science and technology (S&T) centers of excellence and DON, DOD, and other US Government organizations. The direct impact of this investment is to capitalize on international applied research during unprecedented and dynamic global interdependence, increasing the ability to solve DON S&T challenges through shared knowledge and technologies with partners. Additionally, this investment builds global S&T awareness to reduce the risk of potential technological surprise, and supports theater security cooperation goals to sustain cooperative relationships with an expanding set of international partners and to enhance global security. Fleet/Forces Science Advisors: The Naval Science Advisor (SA) Program ensures the Naval Fleet/Forces shape the DON investment in applied research S&T, developing teaming relationships in support and development of technology-based capability options for Naval Fleet/Forces. Funding is also dedicated to applied research efforts in support of the various Naval Fleet/Forces operational commands. The Science Advisors (SA) are a conduit between the Naval Fleet/Forces, ONR, Naval Research Lab (NRL) and the entire Naval Research Enterprise (NRE). Specific Fleet/Forces Science Advisors include the following: - SA, Navy Warfare Development Command (NWDC), provides technical support for the generation and development of advanced warfighting concepts leading to innovative new strategies to address Navy challenges and opportunities. - SA, CNO Strategic Studies Group (SSG) fully partners in the generation of revolutionary warfighting concepts for the Navy of the future. Along with the Technology Fellows, the SA develops the SSG Fall Program which includes researching and inviting lecturers to address the SSG and developing engaging and mind-opening exploration travel for the CNO Fellows and mini exploration travel for all SSG members.			

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B. Accomplishments/Planned Programs (\$ in Millions)			FY 2013	FY 2014	FY 2015
- SA, Chief of Naval Operations Code N81 (OPNAV N81) focuses on disseminating the Navy's warfighting capability/risk analysis products to the broader S&T community resulting in an improved influence of requirements pull on S&T. The N81 - SA, is part of the ONR internal strategy cell membership for updating the Navy S&T Strategic Plan. - SA, Naval Mine and Anti-Submarine Warfare Command (NMAWC) works with the Commander NMAWC who is the lead for the FNC ASW sub-Integrated Program Team (IPT). The SA is directly responsible to the Commander for drafting/modifying capability gaps and enabling capabilities (EC) ideas, vetting them through the sub-IPT members, incorporating modifications, and providing the final recommendation to the Commander for presentation to the Sea Shield IPT. The SA advises Commander on Navy's Tactical ASW and MIW support and countermeasures. FY 2015 Plans: International Science Program: - Continue all efforts of FY 2014. Fleet/Forces Science Advisors: - Continue all efforts of FY 2014. - SA, OPNAV N2/N6 advises the Deputy CNO for Information Dominance, and Flag and SES leadership on Navy S&T programs that address information dominance; member of FNC Technical Oversight Group (TOG) Working Group which prioritizes and selects fifteen EC products that address nine FNC Pillars (i.e. FORCENet, Sea Strike, Shield, and Basing); member of the FORCENet IPT, Rapid Technology Transition Team, and Joint Concept Technology Demonstration Team that reviewed technology programs for the Fleet. - SA, OPNAV N9, serves as the command's principal advisor and the senior representative of the DCNO on initiatives with S&T and Research and Development (R&D) organizations in government, academia, and industry. Advises on technical developments in support of platform warfighting wholeness and informs DCNO on strategic and program issues as they relate to topics in decision forums; and on S&T factors outside the normal Navy program planning process that could afford strategic opportunities or affect or disrupt existing strategies, investments and plans. - SA, Commander, Navy Air and Missile Defense Command, (NAMDC) serves as the command's principal advisor and the representative of the Commander on Integrated Air and Missile Defense (IAMD) initiatives with S&T and R&D organizations in government, academia, and industry. The SA works as part of the Third Fleet Sea Shield Fleet Collaborative Team representing					

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2013	FY 2014
NAMDC. The SA looks at the applied research and S&T aspects of IAMD and align them with the defense industry to pinpoint key requirements and emerging new technologies.			
Title: TRAINING TECHNOLOGIES		4.652	5.030
Description: Training technologies enhance the Navy's ability to train effectively and affordably in classroom settings, in simulated environments, while deployed, and to operate effectively in the complex, highstress, information-rich and ambiguous environments of modern warfare such as asymmetric warfare. Technology development responds to a variety of requirements, including providing more affordable approaches to training and skill maintenance. Improved training efficiency and cost-effectiveness is achieved by applying operations research, modeling and simulation, and instructional, cognitive, and computer sciences to the development, delivery, evaluation, and execution of training. FY 2013 Accomplishments: Cognitive Science of Learning: - Continued research and assessment of advanced gaming technology for enhanced training. - Continued a systematic program of applied research addressing unanswered questions regarding effective instructional strategies in artificially intelligent tutoring. - Continued research into computational neuron-models in the design of training systems. - Continued field studies and user tests evaluating new features and job aiding tools. - Continued creation and conduct of experiments to validate automated performance assessment and after action reviews. - Initiated development of optimal training strategies for intelligent jobs on mobile devices (e.g., iPad). - Initiated development of immersive environments for training interpersonal and leadership skills. - Initiated design and conduct experiment to assess training effectiveness of intelligent tutor for training ship handling skills. - Initiated development of novel psychometric approaches to assess human performance in medical/ military simulations and simulators. - Initiated research in design features of medical and military simulators and simulations. Enhancing Warfighter Cognitive Capability: - Continued task to develop multi-agent based architectures for modeling human behavior, improve techniques for human cognitive and behavioral modeling, and create highly realistic simulated teammates. - Continued research to understand the structural relations among the latent variables of short-term memory, working memory, executive attentional control, and fluid intelligence. - Continued research to assess the improvement in recruit classification provided by the addition of measures of fluid intelligence and working memory.			4.895

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2013	FY 2014
- Initiated research to understand the role of intrinsic motivation in facilitating the transfer of working memory training to other cognitive capabilities. - Initiated research to assess the efficacy of game-based brain training using hand-held (fieldable) hardware platforms. - Initiated research to determine the relationship between induced gains in fluid intelligence and cognitive adaptability and agility, considered from the perspective of military decision-making. Computational Models of Human Behavior: - Continued the integration of cognitive and neuron-computational models of human learning. - Continued research into game based training to more effectively enable better warfighter understanding of languages and cultures to enhance their regional expertise. - Continued research on software tools to facilitate building natural language tutorial dialogs for artificially intelligent tutoring. - Completed research to create computational models of human behavior in selected non-Western environments that reflect the dominant cultural, social, ethnic, and economic determinants of behaviors, attitudes, and beliefs of individuals, groups, and organizations operating in these environments, and exploit these models to forecast responses to our actions and those of others attempting to exert influence in these environments. - Researched to create computational models of human behavior in selected non-Western environments that reflect the dominant cultural, social, ethnic, and economic determinates of behaviors, attitudes and beliefs of individuals, groups and organizations operating in these environments, and exploit these models to forecast responses to US actions and those of others attempting to exert influence over people in these environments. - Developed multi-agent based architectures for modeling human behavior, improve techniques for human cognitive and behavioral modeling, and create highly realistic simulated team mates. FY 2014 Plans: Cognitive Science of Learning: - Continue all efforts of FY 2013. - Initiate research in the neuro-biology of learning including integration of the role of white matter. - Initiate development of games that incorporate AI techniques to teach complex warefighter skills decision-making and problem solving. - Initiate development of intelligent avatars to interact with learners from different cultural, linguistic backgrounds, and preferences. - Initiate development of scenarios generators that produce integrated training (e.g., individual and collective) training. Enhancing Warfighter Cognitive Capability: - Continue all efforts of FY 2013.			

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2013	FY 2014
Computational Models of Human Behavior: - Continue all efforts of FY 2013, less those noted as completed. <i>FY 2015 Plans:</i> Cognitive Science of Learning: - Continue all efforts of FY 2014. Enhancing Warfighter Cognitive Capability: - Continue all efforts of FY 2014. Computational Models of Human Behavior: - Continue all efforts of FY 2014.			
Accomplishments/Planned Programs Subtotals		40.162	49.688
C. Other Program Funding Summary (\$ in Millions)			
N/A			
Remarks			
D. Acquisition Strategy			
N/A			
E. Performance Metrics			
As discussed in Section A, there are a significant number of varied efforts within this PE. Each effort is measured against both technical and financial milestones. Each program effort and its projects are reviewed in depth for technical and transition performance against established goals. The Program Managers conduct routine site visits to performing organizations to assess programmatic and technical progress and most projects conduct an annual or biannual review by an independent board of visitors who assess the level and quality of the Science and Technology (S&T) basis for the project.			