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FY 2008/2009 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2

DATE: February 2007

BUDGET ACTIVITY: 02
PROGRAM ELEMENT: 0602236N
PROGRAM ELEMENT TITLE: WARFIGHTER SUSTAINMENT APPLIED RESEARCH

COST: (Dollars in Thousands)

Project Number & Title	FY 2006 Actual	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
WARFIGHTER SUSTAINMENT APPLIED RESEARCH	96,482	119,759	88,297	93,263	91,967	87,841	73,189	69,938

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This PE supports the Future Naval Capabilities (FNCs) of Expeditionary Logistics, Littoral Combat/Power Projection, and Total Ownership Cost (TOC) Reduction; 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; expeditionary logistics; littoral combat and power projection capabilities; advanced naval materials; medical technologies; environmental quality; biocentric technologies; high speed sealift; cost reduction technologies; and seabasing 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." FY 2008 reflects the reinitiation of Human Systems Integration efforts to develop automation, human interface, and decision support technologies (funded in FY 2005 and prior).

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

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B. PROGRAM CHANGE SUMMARY:

	<u>FY 2006</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
FY 2007 President's Budget Submission	110,056	89,964	77,398	82,173
Congressional Action	0	42,250	0	0
Congressional Realignment	-1,500	0	0	0
Congressional Reduction	0	-12,000	0	0
Congressional Undistributed Reductions/Rescissions	-323	-455	0	0
Execution Adjustments	-9,823	0	0	0
Non-Pay Inflation Adjustments	0	0	-116	103
Pay Raise Adjustment	0	0	3	3
Program Adjustments	0	0	19,689	16,887
Program Realignment	0	0	-8,694	-5,949
Rate Adjustments	0	0	17	46
SBIR Assessment	-1,928	0	0	0
FY 2008/FY 2009 President's Budget Submission	96,482	119,759	88,297	93,263

PROGRAM CHANGE SUMMARY EXPLANATION:

Technical: Not applicable.

Schedule: Not applicable.

C. OTHER PROGRAM FUNDING SUMMARY:

Not applicable.

D. ACQUISITION STRATEGY:

Not applicable.

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E. PERFORMANCE METRICS:

As discussed in Section A, there are a significant number of varied efforts within this PE. For the most part these efforts support the FNC program of the Office of Naval Research. As such, each is monitored at two levels. At the lowest level each is measured against both technical and financial milestones on a monthly basis. Annually each FNC and its projects are reviewed in depth for technical and transition performance by the Chief of Naval Research against goals which have been approved by the Navy's senior flag level Technical Oversight Group.

The FNC managers conduct routine site visits to performing organizations to assess programmatic and technical progress and most projects conduct an annual or bi-annual review by an independent board of visitors who assess the level and quality of the Science and Technology (S&T) basis for the project.

Additionally, most of these projects support specific Defense Technology Objectives (DTO) established by the Director, Defense Research and Engineering (DDR&E). These receive a bi-annual technical and programmatic review under the Technology Area Review Assessment program conducted by DDR&E.

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B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 2006	FY 2007	FY 2008	FY 2009
HUMAN SYSTEMS INTEGRATION	0	0	2,319	2,274

This effort supports the warfighter by designing affordable user-centered systems that are efficient, easy to use, and provide required mission capabilities at lowest lifecycle costs. Such systems will be optimally designed for the right number and types of personnel, requiring minimum training while providing high skills retention.

FY 2008 reflects a reinitiation of work in this field of research, important to the reduction in complex naval systems design, acquisition, operation, and maintenance costs and improvements in the effectiveness of operations. This effort was funded from FY 2002 through FY 2005 in this PE within the Manpower and Personnel activity. Budget priorities led to the gap in funding in FY 2006 and FY 2007. Congressional, DoD, and Navy policies and instructions require Navy and Marine Corps Program Managers to have a comprehensive plan for

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Human Systems Integration (HSI) in the acquisition process to optimize total system performance, minimize total ownership costs, and ensure the system is built to accommodate the characteristics of the user population that will operate, maintain, and support the systems. HSI efforts are part of the planned Capable Manpower FNC during the period FY 2008 - FY 2012.

FY 2008 Plans:

- Initiate research to develop automation and human interface technologies to support collaborative decision-making in which multiple unmanned system operators manage groups of vehicles with optimal manning.
- Initiate research to develop tactical decision making concepts to integrate spatially disparate displays and reduce the reliance of crew support to achieve superior ship commanding officer and crew decision making.
- Initiate HSI tool research, development, and application to engineering efforts to develop robust standardized set of human systems integrated specific modeling and simulation tools to assess the interaction between operators performance by system design by manning levels.

FY 2009 Plans:

- Continue all efforts of FY 2008.

	FY 2006	FY 2007	FY 2008	FY 2009
MANPOWER/PERSONNEL	1,903	2,435	2,477	2,522

These technologies enhance the Navy's ability to select, assign, and manage its people by responding to a variety of requirements, including: managing the force efficiently and maintaining readiness with fewer people and smaller budgets; providing warfighting capabilities optimized for low-intensity conflict and littoral warfare; and operating and maintaining increasingly sophisticated weapons systems while managing individual workload and supporting optimal manning.

This effort further supports the warfighter by providing enhanced capabilities by designing affordable user-centered systems that are efficient, easy to use, and provide required mission capabilities at lowest lifecycle costs. Such systems will be optimally designed for the right number and types of personnel, requiring minimum training while providing high skills retention.

The increase in funding from FY 2006 to FY 2007 is due to integration of products that complete in FY 2007.

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FY 2006 Accomplishments:

- Continued applicant cultures and values program to test the practicality and predictive validity of socialization measures for selection into the military.
- Continued modeling integration of forecasting/trend analysis models across the personnel enterprise.
- Initiated modeling integration methodologies for sailor/marine members' cognitive agents and distribution and assignment system portal.
- Initiated low-velocity impact and shaker table dynamic internal response mapping with new anatomical features and sensor suite GelMan thoracic surrogate. (NRL)
- Completed modeling of forecasting/trend analysis models within functions of the personnel enterprise.

FY 2007 Plans:

- Continue all efforts of FY 2006 less those noted as completed above.
- Complete applicant cultures and values program to assess the practicality and predictive validity of socialization measures for selection into the military.
- Complete modeling integration methodologies for sailor/marine members' cognitive agents and distribution and assignment system portal.

FY 2008 Plans:

- Continue all efforts of FY 2007 less those noted as completed above.
- Initiate development of a virtual, experimental-based software environment to test and evaluate the effect of various incentive structures on resource allocation decision making.
- Initiate development of artificial intelligence and optimization techniques to create simulation based decision support tools for resource allocations across units and battle groups.
- Initiate development of Unit-level tools to enable commanders to analyze the cost implications of their actions and weigh tradeoffs between readiness, cost, and risk.
- Initiate development of intelligent agents to empower total force members to make training and assignment choices that enhance their careers and meet personal goals.
- Initiate research to provide results for guiding the development on an interface allowing experts in HSI to work with subject matter experts to define and refine critical intra-domain concepts while capturing information for future use.

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- Initiate a continuous engineering process evaluation and adaptation to show that the developing process is executable and effective.

FY 2009 Plans:

- Continue all efforts of FY 2008 less those noted as completed above.

	FY 2006	FY 2007	FY 2008	FY 2009
TRAINING TECHNOLOGIES	8,608	11,908	11,186	11,125

Training technologies enhance the Navy's ability to train effectively and affordably in classroom settings, in simulated environments, and while deployed, and to operate effectively in the complex, high-stress, information-rich and ambiguous environments of modern warfare. Technology development responds to a variety of requirements, including providing more affordable approaches to training and skill maintenance.

The FY 2006 to FY 2008 profile enables the planned completion of projects vital to advancing naval training and the initiation of projects to provide enhanced capabilities for personnel operating in the network centric Navy of the future. 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 2006 Accomplishments:

- Continued development of optimized strategies for performance aiding and training.
- Continued training aid research for Close Quarters Battle (team training), immersive interaction applications, and Computer Generated Forces (CGF) for improving training effectiveness in Virtual Environments.
- Continued task to develop multi-agent based architectures for modeling human behavior.
- Continued program on intelligent agents for objective-based training.
- Continued CGF task aimed at improved techniques for human cognitive and behavioral modeling.
- Continued work on effective feedback in artificially intelligent tutoring for dynamic task environments such as anti-air warfare, instrument flying and other characteristic military tasks.
- Continued a systematic program of applied research addressing unanswered questions regarding effective instructional strategies in artificially intelligent tutoring.

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- Continued work on software tools to facilitate building natural language tutorial dialogs for artificially intelligent tutoring.
- Continued task to apply recently developed learning techniques that can be used in a model interacting with its application environment to extend or refine its knowledge base and behavioral competence.
- Continued development of immersive interaction technologies for team training application.
- Continued research in CGF for improving training effectiveness in Virtual Environments.
- 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.
- Completed training aid research for Close Quarters Battle (team training).
- Completed program in intelligent agents for objective-based training.
- Completed modeling of the integration of different military domains into a distributed Virtual Technologies and Environments Full Spectrum Combat simulation.
- Initiated field studies and user tests evaluating new features and job aiding tools.

FY 2007 Plans:

- Continue all efforts of FY 2006 less those noted as completed above.
- Complete development of optimized strategies for performance aiding and training.
- Complete development of immersive interaction technologies for team training application.
- Complete research in CGF for improving training effectiveness in Virtual Environments.
- Complete 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.
- Complete modeling of the integration of different military domains into a distributed Virtual Technologies and Environments Full Spectrum Combat simulation.

FY 2008 Plans:

- Continue all efforts of FY 2007 less those noted as completed above.
- Initiate development of optimized strategies for performance aiding and training.
- Initiate development of virtual technologies for warfare training application.
- Initiate development of technologies to support human performance in networked warfighting environments.
- Initiate development of training technologies for culture, values, and language training and opponent simulation for training systems.

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FY 2009 Plans:

- Continue all efforts of FY 2008.

	FY 2006	FY 2007	FY 2008	FY 2009
LITTORAL COMBAT / POWER PROJECTION	12,086	9,934	10,855	7,242

This activity provides technologies that enhance the ability of the Navy-Marine Corps team to assure access and sustained operations in the littorals. The Littoral Combat/Power Projection FNC considers all the critical functions of warfighting: command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR); fires; maneuver; sustainment; and force protection. This activity includes Urban, Asymmetric Operations-related to FNC Enabling Capabilities, such as advanced fires coordination and interoperability, hostile fire detection/response, and network monitoring, management and secure wireless technology.

FY 2008 through FY 2009 funding levels reflect the alignment of funding to continue and complete FNC efforts previously funded in other PEs.

FY 2006 Accomplishments:

- Continued efforts for laser safety testing of Streak Tube Imaging Light Detection and Ranging (LIDAR) technology being developed as part of the obstacle avoidance system for the Expeditionary Fighting Vehicle (EFV).
- Continued development of advanced weapons materials technology for use in artillery and mortar systems. (Concurrently funded by PE 0602131M)(FY 2007 effort realigned to PE 0603114N).
- Continued development of improved lightweight fire control systems interface technologies. (FY 2007 effort realigned to PE 0602114N).
- Continued development of landmine countermeasure insensitive munitions technology. (Concurrent effort funded by PE 0602131M).
- Continued program to develop oxygen, water vapor and temperature measurement capability for safety during littoral combat (NRL).
- Continued development of advanced fires coordination and interoperability to enable Marine Air-Ground Task Force (MAGTF)/Joint fires. (FY 2007 effort realigned to PE 0603114N)
- Continued development of network monitoring and management tools technology. (FY 2007 effort realigned to

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PE 0603235N)

- Continued development of secure mobile network/secure wireless LAN technology. (FY 2007 realigned to PE 0602131M and PE 0603640M)
- Continued development and transition innovative relays Beyond-Line-of-Sight (BLOS) in the areas of wideband communications and advanced modular systems. (FY 2007 effort realigned to PE 0603235N).

FY 2007 Plans:

- Continue all efforts of FY 2006 less those noted as completed above.
- Continue development of battlefield power generation technologies. (Previous efforts funded by PE 0603123N)
- Complete program to develop oxygen, water vapor and temperature measurement capability for safety during littoral combat (NRL).
- Complete efforts for laser safety testing of Streak Tube Imaging LIDAR technology being developed as part of the obstacle avoidance system for the EFV.
- Complete development of advanced weapons materials technology for use in artillery and mortar systems. (Concurrently funded by PE 0602131M).
- Complete development of improved lightweight fire control systems interface technologies.
- Complete development of landmine countermeasure insensitive munitions technology. (Concurrent effort funded by PE 0602131M).

FY 2008 Plans:

- Continue all efforts of FY 2007 less those noted as completed above.
- Complete development of battlefield power generation technologies.
- Initiate efforts to conduct FNC warfighter sustainment applied research, including technology management of FNC investments supporting the naval enterprise and naval capability pillars.
- Initiate efforts to perform technology analyses to support the development and validation of FNC technology performance metrics for enabling capabilities structured to close naval capability gaps.
- Initiate efforts to assess technology options for the development of applied FNC technologies packaged into deliverable S&T products.

FY 2009 Plans:

- Continue all efforts of FY 2008 less those noted as completed above.

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	FY 2006	FY 2007	FY 2008	FY 2009
ADVANCED NAVAL MATERIALS	8,185	7,206	8,416	8,272

Advanced Naval Materials efforts include: developing advanced, high-performance materials; processes to reduce weight and cost; and enhanced sonar transducers.

Increase from FY 2007 is due to completion of acceptance testing methodologies for advanced transducer materials and welding processes for high-nickel naval steels.

FY 2006 Accomplishments:

- Continued development of ultra light, blast resistant composite structural materials.
- Continued low cost phthalonitrile based organic resin material and hybrid composite development with improved fire resistance; and process development of fiber reinforced foam material.
- Continued development of friction stir welding of steels; high strength, high toughness, affordable ship steels for weight reduction; weld processing of stainless steel; and improved welding consumables for affordable construction of reduced weight, survivable ships.
- Continued development of multifunctional transducer material, high-force high-strain actuators; and evaluation of advanced transducer single crystal high strain materials.
- 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 advanced composites and polymers with fire resistance for ship structures.
- Continued development of nanotube reinforced composite materials for the improvement of their out-of-plane mechanical properties.
- 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 cellular metal blast resistant panels.
- Continued fabrication studies of pultruded sandwich structures for low cost ship structural applications.
- Continued development of cellular metal ballistic armor.
- Continued development of compositional tuning of single-crystal, high-strain transducer materials, for specialized naval system applications.

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- Continued development of cavitation resistant ship rudder coatings based on the FY 2004 shipboard coating study.
- Continued catalyst development and grew vertically aligned carbon nanotubes in existing gated silicon post structures in a Direct Current (DC) plasma Chemical Vapor Deposition (CVD) reactor, obtaining stable field emission and 1 ampere/cm² current densities. (NRL)
- Continued program to optimize a-c loss and mechanical reliability of second generation high temperature superconductors for future naval power applications. (NRL)
- Initiated marine titanium alloy design and development, exploiting anticipated cost reductions for high performance, reduced maintenance naval applications.
- Initiated development of continuous single wall carbon nanotube composite materials for next generation air and naval platforms.
- Initiated evaluation of corrosion performance on the family of conjugated poly (phenylenevinylene) polymers.
- Initiated development of techniques and procedures to enhance hot corrosion and oxidation.
- Initiated development of surface preparation methods and characterization of corrosion performance for future naval ship materials.
- Initiated evaluation of low temperature carburized materials for marine application.
- Initiated development of coating performance and knowledge database for Naval use.
- Initiated development of mechanistic model for stress corrosion cracking in Nickel Aluminum Bronze (NAB).
- Initiated development of Microbiologically Influenced Corrosion (MIC) resistant passive alloys for sea basing.
- Initiated friction stir welding development for control of residual stresses and elimination of distortion in naval steels.

FY 2007 Plans:

- Continue all efforts of FY 2006.
- Complete fabrication studies of pultruded sandwich for low cost, high performance ship structural applications.
- Complete cellular metal blast resistant materials with full section ship hull blast evaluation.
- Complete development of weld processing of stainless steel.
- Complete program to optimize a-c loss and mechanical reliability of second generation high temperature superconductors for future naval power applications. (NRL)
- Initiate development of innovative sonar transducers based on high-strain, high-coupling piezoelectric single crystals.

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- Initiate development of solid-state growth methods for making high-strain, high-coupling piezoelectric single crystals.
- Initiate development of integrated structural composites with blast resistance, manufacturing technologies, and low-cost organic resins with improved fire resistance.
- Initiate development of novel processing technologies for increasing the fatigue strength and corrosion resistance of weldments for ship structures with reduced weight and maintenance requirements.
- Initiate development of friction stir joining of marine titanium alloys.

FY 2008 Plans:

- Continue all efforts of FY 2007 less those noted as completed above.
- Complete development of acceptance testing methodologies for advanced transducer single-crystal high-strain materials.
- Complete development of welding processes and consumables for high-nickel containing naval steels.
- Complete development of phthalonitrile based organic resin material and hybrid composite development with improved fire resistance; and process development of fiber reinforced foam material.
- Complete catalyst development and grow vertically aligned carbon nanotubes in existing gated silicon post structures in a DC plasma CVD reactor, obtaining stable field emission and 1 ampere/cm² current densities. (NRL)
- Initiate development of materials processing methods for single crystal piezoelectrics to make strong, robust sonar transducers.
- Initiate modeling and process development of single-melt cold hearth casting of naval titanium alloys including Ti 5-1-1-1 for enhanced mechanical properties and formability.
- Initiate development of models and characterization methods for dynamic loading (water slamming and blast loading) in polymer composite materials.

FY 2009 Plans:

- Continue all efforts of FY 2008 less those noted as completed above.
- Complete development of compositional tuning of single-crystal, high-strain transducer materials, for specialized naval system applications.
- Complete evaluation of corrosion performance on conjugated poly (phenylenevinylene) polymers.
- Complete development of techniques and procedures to enhance hot corrosion and oxidation.
- Complete development of MIC resistant passive alloys for sea basing.

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- Initiate development of novel growth methods to specialized single crystal transducer materials tuned to requirements of specialized naval systems.

	FY 2006	FY 2007	FY 2008	FY 2009
MEDICAL TECHNOLOGIES	7,515	8,883	12,465	12,378

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. 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, or the logistics of providing self/buddy-carried, life saving technologies for massive battlefield wounds. The National Institutes of Health (NIH) focuses on the basic science of disease processes, not applied research related to development. Programs are either Navy-unique, or complimentary with those of the Army and are coordinated through the Armed Services Biomedical Research Evaluation and Management (ASBREM) Committee to prevent duplication of effort. This project funds the Force Health Protection Future Capability (FHPFC) Program (formerly titled Warfighter Protection Future Naval Capability) and supports the "Sea Warrior" component of the Naval Transformation Roadmap, medical logistics aspects of "Sea Basing" and expeditionary force medical support associated with "Sea Strike".

The increase in funding between FY 2007 and FY 2008 is due to the completion of efforts supporting the Fleet Health Protection Future Capability in FY 2007 and the initiation of new medical technologies efforts.

FY 2006 Accomplishments:

- Continued studies on decompression sickness (DCS) and arterial gas embolism (AGE), to include novel approaches to the prevention, detection and treatment of DCS/AGE, particularly by non-recompressive methods.
- 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 work on shipboard injury, exposure guidelines, and engineering specifications for preventing shock-related injury. Reducing neck, spine and musculoskeletal injury will increase force readiness.

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- Continued work on hearing protection systems and on improved treatment for restoring Noise-Induced Hearing Loss (NIHL). Compensation for hearing loss currently costs DoN over \$70M per year.
- Continued research to treat and prevent attrition due to combat related psychological stress and acute Post-Traumatic Stress Disorder (PTSD), a significant problem for retention of personnel.
- Completed development of ion-exchanged zeolites for hemorrhage control; transitioned product to industry.
- Completed study evaluating vanilloid-based hemostatic agent for hemorrhage control; transitioned to industry.
- Completed study on contribution of substances released from gut following hemorrhage on development of shock.
- Completed three studies on additives for resuscitation fluids; Down-selected one for continued development.
- Completed three studies on effect of low volume fluids in treatment of hemorrhagic shock.
- Completed work on predictive measures for oxygen-induced seizures in Navy and Marine Corps divers.
- Initiated studies related to optimization of diver performance. Operational performance in the undersea environment can be hampered by a variety of environmental stressors.
- Initiated study to identify selective & specific biomarkers for mild and moderate traumatic brain injury (TBI).
- Initiated study to evaluate endomorphin-based product to treat TBI.
- Initiated 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.
- Initiated studies related to biomedical effects of underwater sound. Military divers must operate safely and effectively in potentially complex underwater sound fields.
- Initiated efforts for "stress inoculation" to mitigate the impact of exposure to stressful combat environments prior to deployment.
- Terminated study to characterize therapeutic interventions in wound management. Focus is to reduce morbidity resulting in a quicker return to duty and a reduction in medical resource requirements.
- Terminated study on effect of stress on response to morphine.

FY 2007 Plans:

- Continue all efforts of FY 2006 less those noted as completed or terminated above.
- Complete work on shipboard injury, exposure guidelines, and engineering specifications for preventing shock-related injury. Reducing neck, spine and musculoskeletal injury will increase force readiness.

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- Complete work on hearing protection systems and on improved treatment for restoring NIHL. Compensation for hearing loss currently costs DoN over \$70M per year.
- Complete research to treat and prevent attrition due to combat related psychological stress and acute PTSD, a significant problem for retention of personnel.
- Complete efforts for "stress inoculation" to mitigate the impact of exposure to stressful combat environments prior to deployment.
- Complete study to identify selective & specific biomarkers for mild and moderate TBI.

FY 2008 Plans:

- Continue all efforts of FY 2007 less those noted as completed above.
- Complete study to evaluate endomorphin-based product to treat TBI.
- Initiate program to develop concepts to enhance First Responder capability.
- Initiate program to develop concepts to enhance Forward Resuscitative Surgical capability.
- Initiate program to develop concepts to enhance En Route Care capabilities.
- Initiate efforts to develop concepts to mitigate the effects of health and environmental threats.
- Initiate efforts to develop concepts to enhance the capability to reduce operational injuries.
- Initiate efforts to develop concepts to enhance rapid health surveillance and analysis capabilities for operational commanders.
- Initiate efforts to develop concepts to enhance physical and mental conditioning appropriate for area of operations.
- Initiate efforts to develop concepts to prevent and treat hearing loss.

FY 2009 Plans:

- Continue all efforts of FY 2008 less those noted as completed above.

	FY 2006	FY 2007	FY 2008	FY 2009
ENVIRONMENTAL QUALITY	2,742	3,294	3,555	3,496

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.

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Increase from FY 2006 through FY 2008 is due to initiation of advanced shipboard waste treatment technologies and pilot scale systems development.

FY 2006 Accomplishments:

- Continued efforts in evaluation of novel membranes, development and testing of environmentally benign marine antifouling (AF) coatings, air and noise pollution abatement technologies, automated underwater hull surface preparation, development and testing of new aqueous film forming foam (AFFF) formulations (without perfluorooctanolsulfonates, PFOS), studies to accurately determine input of copper into harbor environments from Navy ship hull coatings, preliminary studies for development of robotic hull bug technology for prevention of fouling.
- Completed evaluation of porous inserts for noise and air emissions reduction from gas turbine engines and emission control technologies for control of emissions from marine diesels.
- Initiated development of new, advanced, environmentally benign AF/Anti-Corrosive (AC) coating systems for Navy platforms, far-term noise and air pollution emissions abatement technology for unrestricted operations, and alternative torch technologies for shipboard plasma waste treatment, and multiple aqueous metal ion sensor to incorporate copper sensor developed in the Strategic Environmental Research and Development Program (SERDP) program for planned combined transition to the Environmental Security Technology Certification Program (ESTCP).

FY 2007 Plans:

- Continue all efforts of FY 2006 less those noted as completed above.
- Complete evaluation of AFFF without PFOS and studies to determine copper input into harbors from Navy ship hull coatings.
- Initiate development of advanced environmentally sound technologies for shipboard waste treatment and pollution abatement systems.
- Initiate pilot scale system development of miniature gasification process for treatment of shipboard solid waste.
- Initiate and complete initial decision report on impact of synthetic lubricants on shipboard oily waste treatment systems.

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FY 2008 Plans:

- Continue all efforts of FY 2007 less those noted as completed above.
- Complete alternate torch technologies for shipboard plasma waste treatment.
- Complete report on cost benefit analysis of improved hull coatings and technologies for prevention of marine fouling.
- Initiate development and modifications to shipboard oily waste treatment systems to accommodate processing of synthetic lubricants.

FY 2009 Plans:

- Continue all efforts of FY 2008 less those noted as completed above.
- Complete pilot scale system development of miniature gasification process for treatment of shipboard solid waste.

	FY 2006	FY 2007	FY 2008	FY 2009
BIOCENTRIC TECHNOLOGIES	1,475	1,051	5,256	5,190

Biocentric technologies provide novel solutions for naval needs based upon the applications of biosensors, biomaterials, and bioprocesses. Topic areas include, but are not limited to development of biologically-based signal processing for medical, surveillance and security applications; bioinspired robotics; microbial or plant engineering to produce high-value naval materials such as energetic compounds or to develop sentinel organisms, and marine mammal diagnostics to support the Navy's Fleet Marine Mammal Systems.

The increase in funding from FY 2007 to FY 2008 is due to consolidation of existing efforts funded under PE 0602123N Activity "Fleet Force Protection and Defense Against Undersea Threats" and PE 0602435N Activity "Coastal Geosciences/Optics/Biology" into this PE 0602236N.

FY 2006 Accomplishments:

- Continued efforts in marine mammal vaccine and immunobiological diagnostics development (originally funded in FY 2004 in PE 0602123N; Congressional plus up funding used in FY 2005; best suited to 0602236N given scope of work).
- Continued engineered microbial synthesis and processing of energetic materials (moved from PE 0602435N in

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FY 2006 because of realignment of activities within that PE).

- Initiated development of innovative naval biosensors, biomaterials, and bioprocess technology.

FY 2007 Plans:

- Continue all efforts of FY 2006.
- Complete efforts in marine mammal vaccine.
- Initiate, develop and demonstrate methods for determining multiple microbial genetic sequences which will have profound implications for detection of environmental pathogens and marine sensory systems using microorganisms. (NRL)
- Initiate program to aid warfighter protection that will provide versatile systems for tagging and tracking using chemical taggants tailored to simultaneously satisfy operational requirements and match optical or physio-chemical detection methods. (NRL)
- Initiate a program to develop a microfabricated analytical system for trace detection of illicit materials including explosives, and other hazardous chemicals. (NRL)

FY 2008 Plans:

- Continue all efforts of FY 2007 less those noted as completed above.

The following tasks will move from PE 0602123N to Biocentric Technologies in FY 2008 due to realignment of funds and focus.

- Continue biomimetic signal processing efforts, such as temporal and temporal pattern recognition for security breaching noise detection and biomimetic sonar systems for operation in air and aquatic environments based on bat echolocation neurophysiology and information processing algorithms.
- Continue efforts in bioinspired quiet, and maneuverable self-propelled line array using high-lift propulsors based on insect biomechanics.
- Continue efforts in naval biosensors, biomaterials and bioprocessing [including benthic microbial energy harvesting system)

The following tasks will move from PE 0602435N to Biocentric Technologies in FY 2008 due to realignment of funds and focus.

- Continue efforts on innovative marine mammal diagnostics (detection of viruses, fungi and bacteria, and immunomarkers).

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- Continue engineering development and optimization of sea-floor sediment energy harvesting system for sustainable and autonomous powering of underwater sensor networks.

FY 2009 Plans:

- Continue all efforts of FY 2008.
- Complete biomimetic signal processing efforts, such as temporal and temporal pattern recognition for security breaching noise detection and biomimetic sonar systems for operation in air and aquatic environments based on bat echolocation neurophysiology and information processing algorithms.

	FY 2006	FY 2007	FY 2008	FY 2009
HIGH SPEED SEALIFT	7,047	11,397	0	0

Fast sealift continues to be a military priority. However, friction drag reduction is increasingly essential for long-range, large-payload Navy ships to travel at high speeds (50+ knots). The High Speed Sealift (HSS) effort focuses on the design of a hydrodynamic experimentation capability to resolve questions pertaining to full-scale implementation of friction drag reduction procedures.

This effort ends in FY 2007.

FY 2006 Accomplishments:

- Continued development of experimentation test plans, management procedures, and system requirements.
- Continued high-speed sea lift system studies.
- Completed procurement of major components required to modify the existing flow facility Large Cavitation Channel (LCC) in Memphis, TN.
- Initiated designs for large-scale testing of technologies, concepts, and systems.
- Terminated installation of major components in the LCC.
- Terminated testing and certification of performance.

FY 2007 Plans:

- Continue all efforts of FY 2006 less those noted as completed or terminated above.
- Complete development of experimentation test plans, management procedures, and system requirements.

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- Complete high-speed sealift system studies.
- Complete designs for large-scale testing of technologies, concepts, and systems.
- Initiate and complete large-scale assembly and testing of technologies, concepts, and systems.
- Initiate and complete experiments for HSS technologies, concepts and systems.

	FY 2006	FY 2007	FY 2008	FY 2009
COST REDUCTION TECHNOLOGIES	6,770	9,116	13,192	17,492

Cost Reduction Technology efforts include: developing ultrareliable materials and sensors to reduce cost by enabling condition-based and zero maintenance capabilities; and airframe and ship corrosion efforts for advanced cost effective prevention and life cycle management technologies. This activity includes the Navy's share of the Versatile, Affordable, Advanced Turbine Engine (VAATE) program for materials. Investments under this activity were previously reported under Advanced Naval Materials. This new activity breakout provides improved clarification of the overall investment scope.

The increase in funding from FY 2006 to FY 2007 is due to a planned increase in previously funded FNC efforts. The increase in funding from FY 2007 through FY 2009 is due to the initiation of FNCs in FY 2008 and the increase in funding of those FNC projects in FY 2009.

FY 2006 Accomplishments:

- Continued development of durable new materials and thermal barrier coatings for naval gas turbine hot sections; environmental barrier coatings for ceramics/composites for gas turbine engines; new thermal barrier technology; materials and processes for high temperature turbine disks; and higher temperature aluminum alloys for propulsion.
- Continued development of road test methodology and coating test metrics for USMC vehicles; longer-life, enhanced-performance self-priming topcoat and corrosion preventive compounds (CPC) for aircraft; and spectral imaging/thermography technology.
- Continued the development of single coat corrosion control coatings for collect/hold/transfer (CHT) tanks.
- Continued development of ultrasonic imaging Non-destructive Inspection (NDI) for aircraft.
- Continued development of ceramic matrix composite turbine blades for gas turbine engines.
- Continued development of calcium magnesium aluminum-silicate (CMAS) resistant thermal barrier coatings.
- Continued development of portable, real-time, NDE (non-destructive examination)/NDI technology for heat damage detection in composite materials.

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- Continued development of nickel-aluminized thermal barrier coating which will be phase compatible with turbine blade alloys.
- Continued development of cavitation resistant ship rudder coatings transitioned from FY 2005 Advanced Naval Materials.
- Continued NDE/NDI technologies for damage detection in composite materials.
- Continued development of fiber-optic Bragg grating demodulation system for structural health monitoring of ships and submarines. (moved from Advanced Naval Materials activity)
- Completed the development of single coat corrosion control coatings for fuel tanks.
- Completed development of magneto resistive NDI for aircraft.
- Initiated development of a revolutionary new thermal spray technology for repair and refurbishment of worn and/or corroded components on ships, aircraft and combat vehicles.

FY 2007 Plans:

- Continue all efforts of FY 2006 less those noted as completed above.
- Complete development of durable new materials and thermal barrier coatings for naval gas turbine hot sections; environmental barrier coatings for ceramics/composites for gas turbine engines; new thermal barrier technology; materials and processes for high temperature turbine disks; and higher temperature aluminum alloys for propulsion.
- Complete development of calcium magnesium aluminum-silicate (CMAS) resistant thermal barrier coatings.
- Complete development of nickel-aluminized thermal barrier coating which will be phase compatible with turbine blade alloys.
- Complete development of standardized road test methodology and coating test metrics for USMC vehicles.
- Complete development of single coat corrosion control coatings for CHT ship tank.
- Complete development of ultrasonic imaging NDI for aircraft.
- Complete NDE/NDI technologies for damage detection in composite materials.
- Complete advance coatings and component for Marine Corps vehicles.

FY 2008 Plans:

- Continue all efforts of FY 2007 less those noted as completed above.
- Initiate development of durable alloys and materials for shipboard and aircraft gas turbine engines and spallation-resistant thermal barrier coatings for shipboard/aircraft marine gas turbine hot sections.

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- Initiate development of advanced materials and processes for high temperature marine turbine disks and combustors.
- Initiate development of oxidation and vanadium/sulfate-resistant high temperature coatings for shipboard/aircraft gas turbine engines.
- Initiate development of CMAS-resistant coatings for ceramic matrix composites.
- Initiate development of high temperature foil bearing coatings for aircraft engine weight reduction.
- Initiate development of high temperature organic matrix composites.
- Initiate development of low-platinum and platinum-free aluminide coatings that are phase compatible with turbine blade alloys and exhibit low oxidation rates.
- Initiate efforts to assess manufacturing issues and reliability of ceramic matrix composites for turbine engines.
- Initiate integrated development of durable thermal barrier coating system with various bond coats for naval aircraft gas turbine hot section.
- Initiate development of materials processing for future gas turbine columbium-based alloys.
- Initiate applied research development on improved non-skid coatings.
- Initiate applied research development on high performance airfield pavements.
- Initiate efforts to conduct warfighter sustainment applied research, including technology management of investments supporting the naval enterprise and naval capability pillars.
- Initiate efforts to perform technology analyses to support the development and validation of FNC technology performance metrics for enabling capabilities structured to close naval capability gaps.
- Initiate efforts to assess technology options for the development of applied FNC technologies packaged into deliverable science and technology products.

FY 2009 Plans:

- Continue all efforts of FY 2008.
- Continue to conduct warfighter sustainment applied research, including technology management of FNC investments supporting the naval enterprise and naval capability pillars.
- Initiate applied research development on improved ship rudder coatings.
- Initiate applied research development on high performance topside coatings.
- Initiate applied research in determining lifting of hot section materials to alternative fuels.

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	FY 2006	FY 2007	FY 2008	FY 2009
SEA BASING TECHNOLOGIES	4,226	12,445	18,576	23,272

This activity includes development and advancement of technologies to support Seabasing. Areas include: advanced hull forms, propulsion, and materials to support high speed, shallow draft, and beachable connectors; innovative connector interface and transfer technologies; advanced wave and position sensors and autonomous controls to support vessel to vessel interfaces; and autonomous conveyance systems to support automated and integrated warehousing.

This effort initiated in FY 2006. The increase from FY 2006 to FY 2007 is due to the continuation of FY 2006 efforts for an entire year. The increase in funding between FY 2007 to FY 2008 is due to the initiation of the Sense and Respond Logistics (S&RL) program. The increase in funding from FY 2008 to FY 2009 is due to a planned increase in funding for the Sea Basing program and the continuation of the S&RL program.

FY 2006 Accomplishments:

- Initiated and completed the first evaluation of seabasing technologies which included: advanced hullforms and lightweight materials; amphibious technologies such as variable geometry Air Cushion Vehicle (ACV) skirts and innovative vehicle transporters, wave motion mitigation; sensors and automated controls to support vessel to vessel interfaces.
- Initiated multiple Innovative Naval Prototype (INP) contracts for preliminary designs in the area of a Sea Base to "Over-the-Shore" Connector Prototype (T-CRAFT) and a Rapidly Deployable Seabasing Stable Transfer Platform.
- Terminated plans for an automated and integrated warehousing INP due to Congressional reductions.

FY 2007 Plans:

- Continue all efforts of FY 2006 less those noted as completed or terminated above.
- Complete the preliminary design phase of the T-CRAFT demonstrator.
- Initiate the down-selection of T-CRAFT designs for further development and model construction and testing.
- Initiate T-CRAFT model construction and testing.
- Initiate the construction of a scaled model of a Rapidly Deployable Stable Transfer Platform demonstrator.
- Initiate a second evaluation of potential Seabasing INP efforts.

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FY 2008 Plans:

- Continue all efforts of FY 2007 less those noted as completed above.
- Initiate planning of T-CRAFT prototype and component development.
- Initiate efforts for the development of technologies supporting automated shipboard assembly of air-delivered weapons.
- Initiate S&RL research in: battlefield fuel management; decision support systems for S&RL; emergent intelligence/intelligent agents for S&RL; and advanced sensors/processes for S&RL.

FY 2009 Plans:

- Continue all efforts of FY 2008.
- Complete T-CRAFT model testing and evaluation.
- Initiate the down-selection of T-CRAFT designs for prototype and component development.

CONGRESSIONAL PLUS-UPS:

	FY 2006	FY 2007
ADVANCED FOULING AND CORROSION CONTROL COATINGS	5,367	6,974

FY 2006 - Combinatorial research techniques were used to synthesize new polymers and formulated libraries of coatings to be evaluated for ship hull antifouling, fouling release, or anticorrosion coatings. The classes of coatings investigated in 2006 include: silicones; silicones with tethered biocides; and silicone modified polyurethanes.

FY 2007 - This effort supports advanced fouling and corrosion control coatings research.

	FY 2006	FY 2007
ADVANCED MAGNETIC RESONANCE IMAGING	480	0

This effort supported research to develop and deliver improved image acquisition hardware and software that enables more detailed visualization of data from the neuroradiological examinations required for TBI patients in military medical facilities.

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	FY 2006	FY 2007
ADVANCED REINFORCED MATERIALS AND NEW MATERIALS FOR AIRCRAFT TIRES	0	996

Initiate applied research and development of advanced materials for the Joint Strike Fighter (SJF) tires. This research program will enhance the strength of naval aircraft tires and improve aircraft landing performance while lowering aircraft weight.

	FY 2006	FY 2007
AMELIORATION OF MILITARY HEARING LOSS	0	996

This effort supports amelioration of military hearing loss research.

	FY 2006	FY 2007
ATMOSPHERIC WATER HARVESTING - MILITARY APPLICATIONS	959	996

FY 2006 - A prototype device was developed for condensing water out of the atmosphere. The device has several novel components in it including a lightweight heat exchanger and a passive phase change heat recovery element.

FY 2007 - This effort supports atmospheric water harvesting for military applications research.

	FY 2006	FY 2007
AUTOMATED LANGUAGE TRANSLATION TOOLS FOR INTELLIGENCE COMMUNITY	958	0

This effort supported research for automatic language translation tools for intelligence community research. Capabilities include 2-way voice-to-voice translation, reading and translation of printed/written material, and possibly, "word spotting" in an auditory stream.

	FY 2006	FY 2007
AUTOMATED VIDEO THREAT RECOGNITION	1,730	0

This effort supported research and development of automated video surveillance threat recognition algorithms

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embedded as ruggedized, rapidly deployable systems to provide persistent surveillance, perimeter security and border surveillance.

	FY 2006	FY 2007
BIOSENSORS FOR DEFENSE APPLICATIONS	1,437	996

FY 2006 - This effort supported research and development of hand-held and autonomous vehicle-mounted biosensors for pollutants and other chemicals of interest in the aquatic environment.

FY 2007 - This effort supports biosensor for defense applications research.

	FY 2006	FY 2007
CONTINUATION OF HYDRATE DESALINATION TECHNOLOGY	1,630	1,445

FY 2006 - Two main efforts were investigated here. In the traditional technique, the performer is trying to control nucleation and growth of hydrate crystals in natural sea water. In a more elaborate technique, the performer is growing a hydrate crystal under pressure on one side of a support grid and melting in on the other side of the grid to release fresh water and hydrate forming gas.

FY 2007 - This effort supports the continuation of hydrate desalination technology research.

	FY 2006	FY 2007
DURABILITY OF COMPOSITE MATERIALS AND STRUCTURES	1,198	1,096

FY 2006 - This effort initiated development into degradation mechanisms due to sea water in marine composite materials with the focus on interfaces, and on methods to mitigate these effects.

FY 2007 - This effort supports durability of composite materials and structures research.

	FY 2006	FY 2007
ENVIRONMENTAL MICROBIOLOGICAL ENERGY HARVESTING	1,149	996

FY 2006 - This effort supported research and development on environmental energy harvesting. This project focused on optimizing this process to yield useful, in situ, sustainable fuel cells.

FY 2007 - This effort supports environmental microbiological energy harvesting research.

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	FY 2006	FY 2007
FRICITION STIR WELDING	1,152	1,096

FY 2006 - This effort continued to demonstration of the feasibility of expanding Friction Stir Welding (FSW) technology beyond aluminum alloys to High Strength Low Alloy (HSLA) steels that are of interest to the Navy and to expand the fundamental understanding of the FSW process to other metals. The specific focus of this effort was to demonstrate a continuous 60-foot FSW in HSLA steel, develop new tools to weld 3/8-inch thick plate, demonstrate travel speeds up to 12-inches per minute, develop zero tilt-angle tools to enhance shipyard applications, and improve 2-D and 3-D numerical modeling capabilities.

FY 2007 - This effort supports friction stir welding research.

	FY 2006	FY 2007
INTELLIGENT PROCESSING OF MULTIFUNCTIONAL COMPOSITE MATERIALS	1,440	0

This effort supported the exploration of new Vacuum Assisted Resin Transfer Molding (VARTM) processing methodologies for aircraft and ship structural applications. As part of the demonstration of the technology an anti-submarine warfare aircraft fairing was manufactured.

	FY 2006	FY 2007
LOW OBSERVABLE AIRCRAFT SEALANTS	0	1,494

This effort supports low observable aircraft sealants research.

	FY 2006	FY 2007
MAGNETIC RESONANCE IMAGING AND MAGNETIC RESONANCE ANGIOGRAPHY FOR ACCURATE DIAGNOSIS OF TRAUMATIC BRAIN INJURY	0	996

This effort supports magnetic resonance imaging and magnetic resonance angiography for accurate diagnosis of traumatic brain injury research.

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	FY 2006	FY 2007
MAST-MOUNTED IN-PORT VIDEO FORCE PROTECTION SURVEILLANCE SYSTEM	3,272	996

FY 2006 - This effort supported the development of a fully functional system with omni directional cameras and embedded intelligent video surveillance capable of being deployed on ships for Force Protection, including testing and validation. This project will assist in the transition of a successfully completed SBIR phase II on intelligent video using mast-mounted 360 degree cameras.

FY 2007 - This efforts supports mast-mounted in-port video force protection surveillance system research.

	FY 2006	FY 2007
MATERIALS AND COATINGS ENHANCEMENTS THROUGH HIGH PERFORMANCE MATERIALS	0	8,619

This effort supports materials and coatings enhancements through high performance materials research.

	FY 2006	FY 2007
METHANE DESALINATION SYSTEMS	958	0

This effort supported using gas (methane) hydrate crystallization process as a means for large scale seawater desalination.

	FY 2006	FY 2007
MULTIFUNCTION COMPOSITES FOR NEXT NAVY SEAFRAMES	2,405	0

This effort initiated development of a new tough flame retardant composite resin system that will enable rapid processing of large advanced multifunctional composite structures for ship applications. This effort also includes the characterization of the fatigue behavior of these composites and the pulltrusion of new structural forms.

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	FY 2006	FY 2007
NATIONAL CENTER FOR ADVANCED SECURE SYSTEMS RESEARCH (NCASSR)	2,682	4,881

FY 2006 - This effort supported research to develop new approaches to information assurance in the areas of security tools, cyber-informatics, network sensors, supervisory control and data acquisition systems (SCADA) systems, and the grid laboratory. These developments will benefit the national information infrastructure, and in addition the Global Information Grid - Enterprise Services (GIG-ES), by providing the means to deploy, monitor, assess, and react to cyber events. Of particular interest is the research on SCADA. These systems are found in many critical infrastructures including electric power grids.

FY 2007 - This effort supports the NACASSR.

	FY 2006	FY 2007
NEUROBIOLOGICALLY INSPIRED COMPUTATIONAL ARCHITECTURES AND METHODOLOGIES	0	3,188

This effort supports neurobiologically inspired computational architectures and methodologies research.

	FY 2006	FY 2007
NONLINEAR SYSTEMS RESEARCH CENTER	958	0

This effort supported damage detection which developed a novel device to detect damage in materials using chaotic forcing and fiber optic readout to discover changes in a material's response. The Micro Electrical Mechanical Systems (MEMS) gyros array effort was a working on-chip surface emitting laser technology for displacement sensing of a MEMS gyro array.

	FY 2006	FY 2007
OPTIMIZING ADAPTIVE WARRIOR PERFORMANCE	1,628	0

This effort supported the final installment for the Magnetic Resonance Imaging (MRI) facility and initiates research to better understand warfighter performance.

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	FY 2006	FY 2007
PARTNERSHIP SIMULATION LABORATORY FOR MILITARY HEALTH	958	1,345

FY 2006 - This effort supported authoring systems for subject matter experts for the Partnership Simulation Laboratory for Military Health Professions and First Responder Education.

FY 2007 - This effort supports the partnership simulation laboratory for military health.

	FY 2006	FY 2007
POSS BIOFILM PACKAGING MATERIALS	959	0

This effort supported research to expanded and advance use of Polyhedral Oligomeric Silsesquioxanes (POSS) nanostructured chemical platforms (cages) polymers into packaging applications focused on Naval needs, such as biodegradable pallet packaging and freezer-less storage of raw seafood products.

	FY 2006	FY 2007
RAPID DETECTION OF BIOWARFARE AGENTS IN WATER	1,437	0

This effort supported rapid detection and response to, airborne biological and chemical agents in battlefield and key urban environments.

	FY 2006	FY 2007
SENSORY SUBSTITUTION FOR WOUNDED SERVICE MEMBERS	0	3,984

This effort supports sensory substitution for wounded service members' research.

	FY 2006	FY 2007
TITANIUM-BASED ALLOY FOR ADVANCED AEROSPACE APPLICATIONS	1,253	0

This effort supported and identifies bulk amorphous titanium alloy compositions with high glass formability and developed melting, casting and processing techniques to optimize alloy microstructure.

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BUDGET ACTIVITY: 02

PROGRAM ELEMENT: 0602236N PROGRAM ELEMENT TITLE: WARFIGHTER SUSTAINMENT APPLIED RESEARCH

PROJECT TITLE: WARFIGHTER SUSTAINMENT APPLIED RESEARCH

	FY 2006	FY 2007
VIRTUAL CLINICAL LEARNING LAB (VCLL)	1,915	0

This effort supported active virtual environment infrastructures using game-based technologies at the Virtual Clinical Learning Lab.

	FY 2006	FY 2007
VIRTUAL CLINICAL LEARNING LAB REALITY SIMULATION ENVIRONMENT	0	996

This effort supports virtual clinical learning lab reality simulation environment research.

C. OTHER PROGRAM FUNDING SUMMARY:

NAVY RELATED RDT&E:

- PE 0308601N Modeling and Simulation Support
- PE 0601103N University Research Initiatives
- PE 0601152N In-House Laboratory Independent Research
- PE 0601153N Defense Research Sciences
- PE 0602123N Force Protection Applied Research
- PE 0602747N Undersea Warfare Applied Research
- PE 0603236N Warfighter Sustainment Advanced Technology
- PE 0603512N Carrier Systems Development
- PE 0603640M USMC Advanced Technology Demonstration (ATD)
- PE 0603721N Environmental Protection
- PE 0603724N Navy Energy Program
- PE 0604561N SSN-21 Developments
- PE 0604703N Personnel, Training, Simulation, and Human Factors
- PE 0604771N Medical Development
- PE 0605152N Studies and Analysis Support, Navy
- PE 0708011N Industrial Preparedness

UNCLASSIFIED

FY 2008/2009 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2a

DATE: February 2007

BUDGET ACTIVITY: 02

PROGRAM ELEMENT: 0602236N PROGRAM ELEMENT TITLE: WARFIGHTER SUSTAINMENT APPLIED RESEARCH

PROJECT TITLE: WARFIGHTER SUSTAINMENT APPLIED RESEARCH

NON-NAVY RELATED RDT&E:

PE 0408042N.SEA National Defense Sealift Fund
PE 0601102A Defense Research Sciences
PE 0602105A Materials Technology
PE 0602211A Aviation Technology
PE 0602303A Missile Technology
PE 0602601A Combat Vehicle and Automotive Technology
PE 0602705A Electronics and Electronic Devices
PE 0602709A Night Vision Technology
PE 0602716A Human Factors Engineering Technology
PE 0602785A Manpower/Personnel/Training Technology
PE 0602786A Warfighter Technology
PE 0602787A Medical Technology
PE 0603002A Medical Advanced Technology
PE 0603003A Aviation Advanced Technology
PE 0601102F Defense Research Sciences
PE 0602102F Materials
PE 0602202F Human Effectiveness Applied Research
PE 0602203F Aerospace Propulsion
PE 0602204F Aerospace Sensors
PE 0602702F Command Control and Communications
PE 0603216F Aerospace Propulsion and Power Technology
PE 0603716D8Z Strategic Environmental Research Program
PE 0603851D8Z Environmental Security Technical Certification Program

D. ACQUISITION STRATEGY:

Not applicable.