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

BUDGET ACTIVITY: 03
PROGRAM ELEMENT: 0603236N
PROGRAM ELEMENT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY

COST: (Dollars in Thousands)

Project Number & Title	FY 2007 Actual	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
Total PE	92,732	101,007	112,520	101,051	117,968	82,961	48,332
2915 WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY	61,822	90,375	112,520	101,051	117,968	82,961	48,332
9999 CONGRESSIONAL PLUS-UPS	30,910	10,632	0	0	0	0	0

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 Science and Technology (S&T) Strategic Plan approved by the S&T Corporate Board (Jan 2007). 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 S&T 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.

Warfighter Sustainment Advanced Technology supports: Manpower and Personnel, Training, and Readiness; and the Future Joint Warfighting Capabilities identified by the Joint Chiefs of Staff. It supports Future Naval Capabilities (FNC) Programs in Airframe/Ship Corrosion; Turbine Engine Technologies; Littoral Combat; Sea Base Planning, Operations and Logistics; and Sea Base Mobility and Interfaces. It develops technologies that enable the Navy to better recruit, select, classify, assign, and manage its people; to train effectively and affordably in classroom settings, in simulated and actual environments, and while deployed; and to effect human systems integration into weapon systems. Other technologies enable reduced operating costs through life-extension of legacy systems and increased efficiency of future propulsion systems and improved diagnostic tools.

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Within the Naval Transformation Roadmap, this investment supports the achievement of all the transformational capabilities of Sea Warrior and the transformational capabilities of: Ship to Objective Maneuver and Time Sensitive Strike required by Sea Strike; Littoral Sea Control and Anti-Sub Warfare required by Sea Shield; Compressed Deployment and Employment Times and Enhanced Sea-Borne Positioning of Assets required by Sea Basing; and Battlespace Integration required by FORCEnet. 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:

	FY 2007	FY 2008	FY 2009
FY 2008/FY 2009 President's Budget Submission	98,758	102,124	110,384
Congressional Action	-2,000	700	0
Congressional Undistributed Reductions/Rescissions	0	-657	0
Execution Adjustments	-1,994	0	0
Program Adjustments	0	0	2,198
Rate Adjustments	0	0	-62
SBIR Assessment	-2,032	-1,160	0
FY 2009 President's Budget Submission	92,732	101,007	112,520

PROGRAM CHANGE SUMMARY EXPLANATION:
Technical: The impact of the $10 million dollar Congressional reduction in FY 2008 to this PE impacts the Sea Base Mobility and Interfaces activity. The Small-to-Large Vessel At-Sea (STLVAST) FNC program reductions have eliminated the program's ability to contract with multiple performers for FY 2008. Program risk has increased because single source performer contracts increase the technical and schedule risk if the lone performer fails to meet STLVAST Program contract phase one requirements.

Schedule: The impact of the $10 million dollar Congressional reduction in FY 2008 to this PE impacts the Turbine Engine Technology activity. The initiation of design and fabrication of Versatile Affordable Advanced Turbine Engines (VAATE) Phase II demonstrator engines with General Electric (GE)/Liberty Works (LW) has been delayed until FY 2009.

C. OTHER PROGRAM FUNDING SUMMARY:
Not applicable.

D. ACQUISITION STRATEGY:
Not applicable.

E. PERFORMANCE METRICS:

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Efforts within this PE support the FNC program and are monitored at two levels. At the lowest level, each is measured against technical and financial milestones on a monthly basis. Annually, each FNC project is reviewed in depth for technical and transition performance by The Chief of Naval Research against requirements approved by the Navy's senior flag level Technical Oversight Group. Routine site visits to performing organizations are conducted to assess programmatic and technical progress. Most are reviewed annually or bi-annually by an independent board of visitors who assess the level and quality of the Science and Technology basis for the project.

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PROJECT NUMBER: 2915 PROJECT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY

COST: (Dollars in Thousands)

Project Number & Title	FY 2007 Actual	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
2915 WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY	61,822	90,375	112,520	101,051	117,968	82,961	48,332

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Warfighter Sustainment Advanced Technology supports Manpower and Personnel, Training, and Readiness; and the Future Joint Warfighting Capabilities identified by the Joint Chiefs of Staff. This project supports FNC Programs in Airframe/Ship Corrosion; Turbine Engine Technologies; Littoral Combat; Sea Base Planning, Operations and Logistics; and Sea Base Mobility and Interfaces. This project develops technologies that enable the Navy to better recruit, select, classify, assign, and manage its people; to train effectively and affordably in classroom settings, in simulated and actual environments, and while deployed; and to effect human systems integration into weapon systems. Other technologies enable reduced operating costs through life-extension of legacy systems, increased efficiency of future propulsion systems and improved diagnostic tools. Within the Naval Transformation Roadmap, this investment supports the achievement of all the transformational capabilities of Sea Warrior and the transformational capabilities of Ship to Objective Maneuver and Time Sensitive Strike required by Sea Strike; Littoral Sea Control and Anti-Submarine Warfare (ASW) required by Sea Shield; Compressed Deployment and Employment Times and Enhanced Sea-Borne Positioning of Assets required by Sea Basing; and Battlespace Integration required by FORCEnet.

B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 2007	FY 2008	FY 2009
SEA BASE PLANNING, OPERATIONS AND LOGISTICS	10,873	18,721	15,328

This activity includes support for Sea Base Collaborative Command and Control; Sea Base Integrated Operations; Surface Connector Vehicle Transfer; Automated Weapons Assembly; and Sense and Respond Logistics. Sea Basing will require more robust afloat command and control for sustainment activities. Logistics must integrate with the joint task force common operating picture, and provide awareness of mission supportability and readiness at an operational and tactical level. This activity will produce techniques and systems to support automated

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transfer of cargo from shipboard unload/onload point to stowage spaces. This activity further supports the Seabasing mission of marshalling troops, equipment, and materials. It will improve current replenishment capabilities for transfer of cargo between Sea Base/Logistics vessels (large ship-to-ship) during high sea states, while maintaining safety of operations. Technologies include high-strength composites, ship-motion compensation for force control-based systems, intelligent systems, and robotics.

FY 2007 - FY 2009 funding profile reflects planned project transitions through land-based and at-sea demonstrations and also the effects of the realignment of FNC Program investments into Enabling Capabilities (ECs). Funding growth was required for FY 2008 to initiate new FNC efforts in Automated Weapons Assembly and Sense and Respond Logistics. The decrease in FY 2009 represents completion of Intra-Connector Material Handling and Large-to-Large Vessel Interface – Lift On/Lift Off efforts.

FY 2007 Accomplishments:

- Continued efforts on the Large to Large Vessel Lift on/Lift off capability
- Completed the efforts of Compact Agile Material Movement including the human amplification technologies via an at-sea demonstration of the technologies.
- Completed efforts of software development for the afloat component of naval sustainment Command and Control (C2).
- Initiated efforts in the development of Interface Ramp Technologies for seabasing.
- Initiated efforts in the development of Intra-Connector Material Handling cargo securing technologies.

FY 2008 Plans:

- Continue all efforts of FY 2007.
- Initiate efforts for the development of technologies supporting automated shipboard assembly of air-delivered weapons.
- Initiate the development of advanced technologies to provide a Sense and Respond Logistics capability.

FY 2009 Plans:

- Continue all efforts of FY 2008 less those noted as completed above.
- Complete efforts for Intra-Connector Material Handling cargo securing technology development via an at-sea demonstration of the technology.

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- Complete efforts on Large to Large Vessel Lift on/Lift off capability via an at-sea demonstration of the technologies.

	FY 2007	FY 2008	FY 2009
SEA BASE MOBILITY AND INTERFACES	12,293	22,180	29,292

This activity includes support for Sea Base Mobility and Interfaces and Force Closure. This activity improves the capability for transfer of cargo between Sea Base/Logistics vessels and employment of combat ready forces over unimproved beaches during high sea states. Capabilities being developed include propulsion technologies, cargo stabilization technologies, and advanced hull technologies needed for sustained operations at high speed in high sea states. This activity further supports the Seabasing mission of transporting troops, equipment, and materials from the seabase to shore, and providing support to seaborne forces via surface distribution interfaces.

FY 2007 - FY 2009 fluctuations result from the planned initiation of projects to support the Navy's developing seabasing concept of operations, to support planned product transitions to new ship programs through land-based and at-sea demonstrations, and to reflect the realignment of FNC Program investments into ECs. The FY 2008 increase from the FY 2007 budget is per the documented Business Plan developed and approved within the FNCs Program. FY 2008 Congressional reduction impacts the Small-to-Large Vessel At-Sea (STLVAST) FNC program by eliminating the program's ability to contract with multiple performers. Program risk has increased because single source performer contracts increase the technical and schedule risk if the lone performer fails to meet STLVAST Program contract phase one requirements. Funding increases between FY 2008 and FY 2009 support several programs that are at the stage where the actual full prototype systems are being manufactured and/or undergoing shipboard integration for major At-Sea Demonstrations that are scheduled to occur in FY 2009. Additionally funding growth is required for fabrication of large scale test articles, such as a waterjet prototype, to support FY 2009 at-sea and land-based technology demonstrations.

FY 2007 Accomplishments:

- Continued work for a beachable high speed craft as a Sea Base mobility interface.
- Continued efforts on the Large to Large Vessel Lift on/Lift off capability.
- Continued technology exploration in hydrodynamic impacts and design space trade studies.
- Continued efforts on the High Speed Sea Base to Shore Connector technology development.
- Continued efforts to develop technologies for Small to Large At-Sea Vessel Interfaces.

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- Continued the development of concepts for High Rate Horizontal and Vertical Material Movement within the Sea Base.
- Continued efforts to develop a large scale Axial Flow Waterjet technology.
- Initiated efforts to develop blade control technology for the heavy lift vertical air replacement platform.

FY 2008 Plans:

- Continue all efforts of FY 2007 (Impact of Congressional reduction: Small-to-Large Vessel At-Sea (STLVAST) FNC program reductions have eliminated the program's ability to contract with multiple performers. Program risk has increased because single source performer contracts increase the technical and schedule risk if the lone performer fails to meet STLVAST Program contract phase one requirements.).

FY 2009 Plans:

- Continue all efforts of FY 2008.
- Complete efforts on the High Speed Sea Base to Shore Connector technology development through at-sea demonstrations of the technologies.
- Complete efforts in Small to Large At-Sea Vessel Interfaces through at-sea demonstrations of the technologies.
- Complete efforts in the Axial Flow Waterjet program through an at-sea demonstration of the technology.
- Complete efforts in the High Rate Horizontal and Vertical Material Movement within the Sea Base.
- Initiate efforts to develop large ship fuel savings technologies for high speed materiel transport ships and follow on efforts initiated under Friction Drag Reduction.

	FY 2007	FY 2008	FY 2009
FRICTION DRAG REDUCTION	0	2,453	1,250

This activity is a collaborative effort with the Defense Advanced Research Agency (DARPA) and the Program Executive Officer for Ships (PEO Ships). The objective is to unambiguously demonstrate the performance of large-scale predictive models that incorporate sufficient physics from first-principles models on a large or full-scale ship test vehicle.

FY 2008 - 2009 funding profile reflects the phased completion of the Friction Drag Reduction program at the end of FY 2009.

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FY 2008 Plans:

- Initiate design of large-scale demonstrator; modify demonstrator to install drag reduction equipment and sensors.
- Initiate at-sea large-scale demonstrator test.
- Initiate design of an optimal implementation of additive-based drag reduction technology using large-scale predictive models.

FY 2009 Plans:

- Complete large-scale flat-plate test and data reduction.

	FY 2007	FY 2008	FY 2009
SEA BASING	6,618	13,559	26,221

This activity includes advancement of technologies to support the design and development of Sea Base Enabler Innovative Naval Prototypes (INP's). Areas include design and development of various Sea Basing prototypes in the areas of high speed, shallow draft and beachable connectors; and vessel to vessel interfaces.

The Sea Base Enabler INP effort was initiated in FY 2006. The INP program spans from conceptual design through prototype fabrication and testing. The increasing budget between FY 2007 and FY 2009 represents changes in complexity and cost going from preliminary design and model development through prototype fabrication. In FY 2008 and FY 2009 this INP plan includes the completion of the development and at-sea testing of the Rapid Deployable Seabasing Stable Transfer Platform demonstrator; the continuation of several land based and tow-tank based model construction and testing for the Sea Base to "Over-the-Shore" Connector Transformational Craft (T-CRAFT) Prototype; and the full scale component-level development, evaluation, and testing of critical T-CRAFT technologies. In addition, technology components of the Expeditionary Craft (E-CRAFT) program are pursued in this activity

FY 2007 Accomplishments:

- Continued multiple INP contracts for preliminary designs in the area of a T-CRAFT and a Rapidly Deployable Seabasing Stable Transfer Platform.

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- Completed the preliminary design phase of the T-CRAFT demonstrator.
- Initiated the down-selection of T-CRAFT designs for further development and model construction and testing.
- Initiated T-CRAFT model construction and testing.
- Initiated the construction of a scaled model of a Rapidly Deployable Stable Transfer Platform demonstrator
- Initiated a second evaluation of potential new Seabasing INP efforts.

FY 2008 Plans:

- Continue all efforts of FY 2007 less those noted as completed above.
- Complete the development of the Rapidly Deployable Seabasing Stable Transfer Platform demonstrator.
- Initiate planning of T-CRAFT prototype and component development.

FY 2009 Plans:

- Continue all efforts of FY 2008 less those noted as completed above.
- Complete T-CRAFT model testing and evaluation.
- Initiate the down-selection of T-CRAFT designs for prototype and component development and fabrication.
- Initiate testing and evaluation of E-CRAFT demonstrator hydrodynamic and structural characteristics.

	FY 2007	FY 2008	FY 2009
MANPOWER AND PERSONNEL DEVELOPMENT	5,199	5,040	5,435

This activity provides Navy personnel system managers with the ability to attract and retain the right people and to place them in jobs that best use their skills, training, and experience. Application of modeling and simulation, mathematical optimization, advanced testing, statistical forecasting, information visualization, data warehousing, data cleansing, web-based knowledge management, and human performance measurement technologies enhances Fleet readiness and reduces personnel costs.

FY 2007 Accomplishments:

- Completed Web Based Marketplace for Sailors and Jobs, the computational operating environment in which the command, broker, and Sailor cognitive agents will interface to distribute and assign military personnel.
- Completed advanced development of Cultures and Values Selection for integration with other selection and classification measures.

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- Completed Integrated Whole Person Assessment, which integrates Attrition Reduction Technologies, Non-Cognitive Measures, and Rating Identification Engine (RIDE)/Job and Occupational Interest in the Navy (JOIN).
- Completed Integrated Sailor/Marine Career Management System, which integrates Career Case Manager Technologies Distribution Incentive System.
- Completed development of advancement and retention analytical tools for Comprehensive Optimal Manpower & Personnel Analytical Support System (COMPASS), formerly titled Integrated Personnel Situational Monitoring, Analysis, and Response Technologies.

FY 2008 Plans:

- Initiate development and demonstration of decision support tools linked with Sea Warrior.
- Initiate advanced selection, classification and assessment metrics to facilitate optimal labor substitution.
- Initiate integration and multi-faceted decision support tools to evaluate manpower alternatives.
- Initiate development and demonstration of behaviorally-based predictive models.

FY 2009 Plans:

- Continue all efforts of FY 2008.
- Initiate experiments and demonstration of independent dynamic supply and demand models for Navy skill sets.
- Initiate development of a prototype assessment measure of team adaptive performance.

	FY 2007	FY 2008	FY 2009
TRAINING SYSTEMS	10,442	10,181	10,865

This activity improves mission effectiveness and safety by applying both simulation and instructional technology to the design of affordable education and training methods and systems. Improved training efficiency and cost-effectiveness is achieved by applying operations research, modeling and simulation, and instructional, cognitive, and computer sciences to the logistics, development, delivery, evaluation, and execution of training.

FY 2007 Accomplishments:

- Completed advanced technologies for Interactive Electronic Technical Manuals.
- Completed Virtual Technologies and Environments (VIRTE) Demonstration III.

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- Completed advanced technologies for collaborative network-centric visualization systems.

FY 2008 Plans:

- Initiate research and assessment of advanced gaming technology for enhanced training.
- Initiate development and demonstration of technology for enhanced human performance in networked environments.
- Initiate developments for enabling better warfighter understanding of languages and cultures to enhance their regional expertise.

FY 2009 Plans:

- Continue all efforts of FY 2008.
- Initiate advanced technology development demonstrations of game based training for better warfighter understanding of languages and cultures to enhance their regional expertise.
- Initiate experiments to validate automated performance assessment and after action reviews.
- Initiate development of an Adaptive Expert System to automatically and rapidly analyze aircrew performance (1M+ flight hours annually) to detect human factors related mishap leading indicators using a new technique with anomaly and corroboration.

	FY 2007	FY 2008	FY 2009
HUMAN SYSTEMS INTEGRATION	0	3,705	4,295

This effort 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 from FY 2007 to FY 2008 is due to reinitiating work in this field of research, so 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; 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 Human Systems Integration (HSI) in the acquisition process to optimize total system performance, minimize total ownership costs, and ensure the

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system is built to accommodate the characteristics of the user population that will operate, maintain, and support the systems. A strong HSI effort is required to meet these goals. The funding increase from FY 2008 to FY 2009 supports research in commanding officer/crew decision making and studies for control and monitoring multiple unmanned vehicles.

FY 2008 Plans:

- Initiate research to develop and demonstrate 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 and demonstrate advanced tactical decision making technologies to integrate spatially disparate displays and reduce the reliance of crew support to achieve superior ship commanding officer and crew decision making.
- Initiate HSI interface display research to improve ships personnel's ability to efficiently and effectively detect, recognize, and identify noisy targets in ambiguous and uncertain dynamic environments.
- 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.
- Initiate experiments to study design issues related to simultaneous control and monitoring of a multiple unmanned surface and air vehicles. Of particular importance are issues monitoring and control of multiple vehicles, planning and re-planning as environmental findings from sensors are interpreted, and safety and collision avoidance.

	FY 2007	FY 2008	FY 2009
TURBINE ENGINE TECHNOLOGY	10,725	7,850	10,800

This activity provides integration and experimental engine testing of advanced gas turbine engine technologies to reduce their technical risk and demonstrate their readiness for transition. These technologies will enable advanced capabilities for Navy weapon systems at reduced total ownership costs. Versatile Affordable Advanced

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Turbine Engines (VAATE) is a DoD/DOE/NASA/Industry program to develop and demonstrate versatile, affordable, advanced engine technologies enabling for increased systems capabilities and reduced total ownership costs. The VAATE goal is 10X improvement in propulsion system affordability (capability/cost) by 2017, with interim goals of 4X by 2009 and 6X by 2013. The elements of the capability-to-cost index are increased thrust to weight; decreased specific fuel consumption; and reduced development, production, and maintenance costs for the entire integrated propulsion system. To achieve these goals, VAATE is organized into multiple product areas. Specifically for the Navy, the focus, as part of the Enterprise and Platform Enablers FNC, is on turbine engine capability enhancements for future and emerging systems. Technologies critical to Navy fighter jets are being worked, including low pressure turbine technologies for short takeoff and landing; high pressure turbine technologies for higher temperature, longer life; fan and compressor technologies for greater engine robustness and durability, and instrumentation and control technologies for greater engine state awareness and less unscheduled maintenance. Technologies being demonstrated include advanced aerodynamic, material, and structural concepts and emerging active control, prognostic health management, thermal management, aircraft subsystem integration, and information technologies.

The decrease in funding from FY 2007 to FY 2008 is due to Congressional reductions against this PE. As a result of the reduction the initiation of the design and fabrication of VAATE Phase II demonstrator engines with GE/LW has been delayed until FY 2009. The increase in funding from FY 2008 to FY 2009 is due to the completion of the testing of the VAATE Phase I demonstrator engine and the hardware fabrication and assembly of the VAATE demonstrator engine.

FY 2007 Accomplishments:

- Continued VAATE Phase I: Design, component development, integration and fabrication of Phase I demonstrator engines.
- Initiated assembly, instrumentation, and testing of VAATE Phase I demonstrator engines with General Electric (GE)/Liberty Works (LW) and Pratt & Whitney (P&W).

FY 2008 Plans:

- Continue all efforts of FY 2007.
- Complete initial testing of VAATE Phase I demonstrator and core engines with GE/LW and P&W.
- Initiate development of shipboard compact power conversion technologies for multi-function motor drives, bi-directional power conversion modules, and power management controllers.

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- Initiate design and fabrication of VAATE Phase II demonstrator engines with GE/LW and P&W. (Impact of Congressional reduction: Design and fabrication of VAATE Phase II demonstrator engines with GE/LW has been delayed until FY 2009.)

FY 2009 Plans:

- Continue all efforts of FY 2008 less those noted as completed above.
- Complete hardware fabrication and assembly of the VAATE demonstrator engine with P&W.
- Complete reporting shipboard compact power conversion project under this Program Element (PE). These efforts transition to PE 0603123N Force Protection Advanced Technology, R2 Activity Surface Ship & Submarine Hull Mechanical and Electrical (HM&E) in FY 2009
- Complete testing of VAATE Phase I demonstrator engines with GE/LW and P&W.
- Initiate design and fabrication of VAATE Phase II demonstrator engine with GE/LW.

	FY 2007	FY 2008	FY 2009
AIRFRAME/SHIP CORROSION	3,783	2,271	2,639

This activity includes an integrated approach for the control of the effects of external and internal corrosion in Naval weapon systems. The work develops advanced, cost effective prevention and lifecycle management technologies. This is particularly significant to life extension for the aging fleet.

The funding profile from FY 2007 to FY 2009 reflects the reorganization of the FNC Program investments into EC's.

FY 2007 Accomplishments:

- Continued Nondestructive Inspection (NDI) technology for heat damage detection on composite materials.
- Completed development of road test method for Marine Corps vehicles.
- Completed the development of NDI Technology for aircraft metal and composite structures to detect cracks and defects.
- Completed the development of single coat systems for Collection-Holding-Transfer (CHT) ship tanks.

FY 2008 Plans:

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- Continue all efforts of FY 2007 less those noted as completed above.
- Initiate development on improved non-skid coatings.
- Initiate development on improved ship rudder coatings
- Initiate development on high performance topside coatings
- Initiate development on high performance airfield pavements.

FY 2009 Plans:

- Continue all efforts of FY 2008.
- Initiate evaluation of advanced material coatings for erosion control on helicopter main rotor blade leading edges.

	FY 2007	FY 2008	FY 2009
LITTORAL COMBAT	1,889	4,415	6,395

The goal of Littoral Combat is the application of technologies to enhance the ability of the Navy/Marine Corps team to execute the Naval portion of a joint campaign in the littorals. This activity considers all the critical functions of warfighting: command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR), fires, maneuver, sustainment, force protection, and training. The activity includes support to the following FNC ECs; Battlefield Power, Reduced Support Costs 1, Advanced Naval Fires Technology Spiral 1, Combatant Commander (COCOM) to Marine Combat Identification (ID), Global Information Grid (GIG)-Compliant Networking, Hostile Fire Detection and Response Spiral 2, Position-Location-Information, Reduced Cost of Operations 1, Sea Base Collaborative Command and Control, Sea Base Mobility and Interfaces, and Sea Base Integrated Operations.

The growth in FY 2007 to FY 2008 reflects the Battlefield Power refined funding profile from initiation. The FY 2008 to FY 2009 growth reflects Technology Oversight Group (TOG) approval of a new EC to develop enhanced individual protective systems for the Warfighter. The FNC program provides the best technology solutions to stated OPNAV requirements by bundling discrete but interrelated Science & Technology products that deliver a distinctly measurable improvement within a five-year time frame.

FY 2007 Accomplishments:

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- Initiated development of battlefield power generation technologies lunchbox sized 500 – 1000W portable JP-8 fueled generator.

FY 2008 Plans:

- Continue all efforts of FY 2007.

FY 2009 Plans:

- Continue all efforts of FY 2008.
- Initiate development of advanced lighter weight modular individual protective system that will provide increased flexibility and protection for the warfighter. (Concurrent effort funded by PE 0602131M and PE 0603640M).

C. OTHER PROGRAM FUNDING SUMMARY - NAVY RELATED RDT&E:
PE 0206624M Marine Corps Combat Services 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 0602131M Marine Corps Landing Force Technology
PE 0602236N Warfighter Sustainment Applied Research
PE 0603512N Carrier Systems Development
PE 0603640M USMC Advanced Technology Demonstration (ATD)
PE 0604703N Personnel, Training, Simulation, and Human Factors
PE 0605013M Information Technology Development
PE 0605152N Studies and Analysis Support - Navy

OTHER PROGRAM FUNDING SUMMARY - NON-NAVY RELATED RDT&E:
PE 0601102A Defense Research Sciences
PE 0602211A Aviation Technology
PE 0603003A Aviation Advanced Technology
PE 0603007A Manpower, Personnel and Training Advanced Technology

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PROJECT NUMBER: 2915 PROJECT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY

PE 0601102F Defense Research Sciences
PE 0602203F Aerospace Propulsion
PE 0603216F Aerospace Propulsion and Power Technology

D. ACQUISITION STRATEGY:
Not applicable.

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PROGRAM ELEMENT: 0603236N PROGRAM ELEMENT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY
PROJECT NUMBER: 9999 PROJECT TITLE: CONGRESSIONAL PLUS-UPS

CONGRESSIONAL PLUS-UPS:

	FY 2007	FY 2008
ADAPTIVE IED TACTICAL SYSTEM	1,408	0

This effort provided analysis of existing processes by which Scenario-Based Training (SBT) content is generated, used, modified/improved, and/or discarded. It used current information to generate SBT components that can be easily modified by the instructor to intensify specific training objective. It evaluated and reported on an SBT tool during two separate Explosive Ordnance Disposal training exercises.

	FY 2007	FY 2008
ADVANCED COMPOSITE MATERIALS RESEARCH	3,157	0

The Composite Vehicle Research Consortium (CVRC) reviewed vehicle survivability and occupant safety and developed standardized testing techniques for burst, blast, and fire. It researched composite joining, identified multi-functional composite materials, and initiated experimental verification of material, morphological, & processing parameters. The CVRC evaluated the approach to non-destructive inspection and identified candidate techniques that will provide structural health monitoring of heavy-duty vehicles. The fatigue life of composites was reviewed and assessed along with the experimental techniques to evaluate strain regimes. A model to predict fatigue life and durability of composites was conceptually developed. The CVRC researched and identified designs in nature that also possess the attributes similar to composites. Lastly, the design and manufacturability of composites was reviewed and an instrumented tool for verification of process simulation models was designed and fabricated.

	FY 2007	FY 2008
AUTONOMOUS SUSTAINMENT CARGO CONTAINER (ASCC) DELIVERY SYSTEM	1,942	0

This effort conducted a preliminary design phase for strap-on propulsion and navigation modules on International Organization of Standardization (ISO) containers for autonomous transfer of cargo from ship to shore. Recent deliverables included a design concept overview, a mission requirements and scenario description, and a discussion of key performance parameters.

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	FY 2007	FY 2008
CURVE PLATE TECHNOLOGY	971	0

This effort supported curve plate technology research. Designed, fabricated and constructed full-scale stainless steel curved bulkheads, keel and longerons using curved plate precision welding and fabrication for assemblies for hybrid scaled down slamming load facility (with installed composite material panels which included pressure gauges and strain sensors), to measure slamming load characteristics vs. sea states. Additionally, this effort refined and delivered computer aided manufacturing models and the developmental weld distortion models for thin section steel welding and fabrication technology.

	FY 2007	FY 2008
DEFENSE SYSTEMS MODERNIZATION AND SUSTAINMENT INITIATIVE	1,456	0

The project was concerned with legacy sea ground and air vehicles. It developed (a) advanced low cost wireless sensors to aid in extending Asset Health Monitoring system capability and (b) analysis and design methodologies to insure safe and uninterrupted operation of critical systems subject to internal failures, external disturbance, or targeted attack. It integrated materials aging and prognostics, material restoration and repair, and system remanufacturing research to advance the science of determining military components wear and fatigue processes. Besides monthly and final reports to ONR program describing technologies and tools developed to aid in platform design and maintenance, deliverables included an innovative maintenance system for ONR’s new E-Craft vessel and input to the Marine Corps’ EPLS contract for the Light Armored Vehicle.

	FY 2007	FY 2008
ENVIRONMENTALLY-SEALED RUGGEDIZED AVIONICS DISPLAYS	0	1,591

This project will develop a production representative display system, perform qualification testing, conduct platform integration tasks, perform certification testing to include thermal, vibration, pressure, and destructive test regimes that qualify the prototype for military use and establish an assembly/integration facility. This project could reduce the manpower currently required for maintenance and cleaning of filters in vertical lift helicopters and unmanned aerial vehicles as a result of harsh combat operational environments.

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	FY 2007	FY 2008
HEET	3,108	0

This project developed and tested advanced fuel cell systems using hardware in the loop (HIL) methods to evaluate performance and durability and evaluated the potential for using hydrates as a fuel for undersea fuel cell applications. This effort leveraged industrial, government laboratory, and international collaboration to conduct field and laboratory work in fuel cells and methane hydrates, conducted an International Workshop on Methane Hydrates, and reported the results.

	FY 2007	FY 2008
INTELLIGENT WORK MANAGEMENT	1,410	0

This effort expanded the Intelligent Work Management (IWM) scheduling capabilities, including the addition of temporal and resource constraints as well as disjunctive tasking (more than one way to satisfy a tasking requirement being competitively scheduled). Additionally, it expanded the applications scheduler using IWM, including areas such as Watch Bill and Long Range Training Plan scheduling. It delivered a scheduling system suitable for application in shipboard maintenance.

	FY 2007	FY 2008
LITTORAL COMBAT SHIP (LCS) NETWORKED TACTICAL TRAINING SYSTEM (NTTS)	973	994

FY 2007 Accomplishments - This effort designed and developed a complementary LCS training system to support trainee throughput using low cost, high fidelity mission modules, bridge/navigation, damage control, and maintenance simulator-based training technology. It developed high fidelity acoustic propagation/loss models to support ASW and Mine Warfare (MIW) mission module training. It developed combat system graphical user interface and communication system emulators necessary for LCS crew members to conduct individual, team, and integrated team training. It delivered a simulation-based training capability for the LCS which includes both mission package and sea frame crew training modules.

FY 2008 Plan - This effort supports the littoral combat ship (LCS) networked tactical training system.

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	FY 2007	FY 2008
MISSION READINESS ADVANCEMENTS FOR VERTICAL LIFT AIRCRAFT	1,417	0

This effort focused on developing better tools and depot processes to ensure worker safety. It also developed next-generation depot manufacturing processes that are more cost effective, as well as developing the capability to provide aircraft spare parts on demand.

	FY 2007	FY 2008
NADEP CHERRY POINT CENTER FOR VERTICAL LIFT - INSTITUTE FOR MAINTENANCE SCIENCE AND TECHNOLOGY	1,319	2,384

FY 2007 Accomplishments - This effort facilitated science and technology insertion into a dedicated activity to identify, demonstrate, validate, and assist in implementing improved maintenance products, procedures, and processes into depot operations. The payoff of these technology advancements increased readiness by improving maintenance operations and decreasing maintenance cycle times for rotary wing aircraft.

FY 2008 Plan - This project will address the sustainment needs of the military and its commercial military contractors by infusing new technology, methodologies, materials and training into maintenance and rework operations. It will develop educational programs to train a new generation of hi-tech workers in the latest advances in maintenance technology. It will support increased readiness and total cost of ownership reduction through implementation of more efficient and rapid procedures while improving maintenance cycle times in addition to providing increased workforce efficiency through implementation of effective training curricula.

	FY 2007	FY 2008
NATIONAL CENTER FOR RESEARCH ON EVALUATION, STANDARDS, AND STUDENT TESTING (CRREST) SKILL SET ANALYSIS	5,050	2,384

FY 2007 Accomplishments - This effort provided technical support to Surface Warfare Officer's School (SWOS) curriculum development by designing and building Subject Matter Expert (SME)/instructor user friendly assessment and authoring tools for simulation based instruction. The assessment tools provided the capability of SWOS instructors to design/build performance based tests that are reliable and predictive of on the job performance of officers in operational environments. Final reports documenting and describing the results of the proof-of concept demonstrations and the research performed were provided.

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FY 2008 Plan - This effort will conduct research addressing factors contributing to effective verbal simulation-based training with an application focus of ship handling training in the Surface Warfare Officer's School (SWOS) Conning Officer's Virtual Environment (COVE). Additionally research will be conducted on effectiveness of instructional design and assessment. Three instructional lessons are to be developed; one on cognition and the cognitive architecture, the second on instructional method and strategies, and the third on assessment.

	FY 2007	FY 2008
ON-DEMAND DISTRIBUTED TRAINING FOR THE WARFIGHTER (ODTW)	2,192	0

This effort built and demonstrated a prototype onboard mission rehearsal system (software) for damage control for the Littoral Combat Ship (LCS).

	FY 2007	FY 2008
PHOTONIC MACHINING OF ELECTRONIC MATERIALS	971	0

This effort involved non-traditional machining process development for electro-optic materials such as conformal domes. For this purpose, femtosecond and superpulse laser machining, reactive-atom plasma technology and magnetorheological finishing were utilized. In addition, material specifications and metrology systems were developed and delivered.

	FY 2007	FY 2008
PROTECTIVE APPAREL TECHNOLOGY SYSTEMS	1,942	795

FY 2007 Accomplishments - This effort expanded and diversified the Institute for Protective Apparel Research and Technology (IPART) faculty, students, scientists and other institutions. Developed near term design concepts and demonstrations with today's materials via appropriate performance tests, simulations, and data integration techniques. Integrated new comfort, fit and thermal management data sources into design process. Established thermal and moisture environmental performance databases with both fabric and garment data. Identified and tested promising flexible and composite ballistic materials. Integrated human surrogate test data into protective apparel near term design solutions and advanced design concepts design process.

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Implemented dynamic apparel performance databases.

FY 2008 Plan - This effort supports protective apparel technology systems.

	FY 2007	FY 2008
SHIPBOARD PERSONAL LOCATOR BEACON	1,262	0

This effort developed a Shipboard Personal Locator Beacon capability for application on ships. An empirical evaluation of the prototype was used to establish real life loading models for the network. These models were then used to determine if an entire crew's location can be monitored full time and how much condition data can be monitored. It delivered a wearable Shipboard Personal Locator beacon suitable for application aboard Navy, Coast Guard, and commercial ships.

	FY 2007	FY 2008
TRAINING TRANSFORMATION FOR THE PACIFIC	2,332	0

This effort enhanced and installed ASW helicopter (SH-60B and SH-60F) mission rehearsal tactical team trainers (MRT3) at Kaneohe Bay, HI, for use by Pacific Fleet aviators to maintain ASW mission readiness and to participate in Fleet Synthetic Training (FST) exercises. It designed and developed the Toolkit for Medical Modeling (TOMM) to support MARFORPAC and PACOM pandemic modeling requirements. It transitioned and integrated modeling and simulation (M&S) technologies from Joint Forces Command (JFCOM) and service M&S proponents to augment existing Pacific Command (PACOM) training capabilities and to stand-up the Pacific Warfighting Center (PWC). It delivered MRT3 trainers to USMC Air Station, Kaneohe Bay, to maintain ASW mission readiness among SH-60 aircrews, and also a TOMM modeling capability (software) to support mission planning and readiness in the face of wide-spread disease among military personnel.

	FY 2007	FY 2008
VALIDATION OF PROGNOSTIC OF HEALTH MANAGEMENT SYSTEMS	0	2,484

This project will utilize an existing test facility to measure dynamic characteristics of rolling element bearings. It will validate new prognostics and health management software and extend as necessary to account for new data. This validation will create fleet management tools to be developed and released for

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implementation. This software could be used to validate critical joint Strike Fighter engine dynamic characteristics to determine life remaining and damage to engines in the fleet.