

# UNCLASSIFIED

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

DATE: February 2007

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

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
<b>Total PE</b>	102,924	98,758	102,124	110,384	118,130	138,420	100,502	76,488
2915 WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY	63,198	65,136	102,124	110,384	118,130	138,420	100,502	76,488
3008 HIGH SPEED SEALIFT VESSEL	648	0	0	0	0	0	0	0
9999 CONGRESSIONAL PLUS-UPS	39,078	33,622	0	0	0	0	0	0

**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. 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.

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).

# UNCLASSIFIED

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BUDGET ACTIVITY: 03  
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Due to the number of efforts in this PE, the programs described herein are representative of the work included in this PE.

# UNCLASSIFIED

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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	106,927	82,035	113,390	105,453
Congressional Action	0	33,750	0	0
Congressional Realignment	-4,200	0	0	0
Congressional Reduction	0	-16,651	0	0
Congressional Undistributed Reductions/Rescissions	-441	-376	0	0
Execution Adjustments	2,802	0	0	0
Non-Pay Inflation Adjustments	0	0	-137	99
Program Adjustments	0	0	3,379	3,975
Program Realignment	0	0	-14,561	779
Rate Adjustments	0	0	53	78
SBIR Assessment	-2,164	0	0	0
FY 2008/FY 2009 President's Budget Submission	102,924	98,758	102,124	110,384

**PROGRAM CHANGE SUMMARY EXPLANATION:**

Technical: Not applicable.

Schedule: Not applicable.

**C. OTHER PROGRAM FUNDING SUMMARY:**

Not applicable.

**D. ACQUISITION STRATEGY:**

Not applicable.

**E. PERFORMANCE METRICS:**

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

# UNCLASSIFIED

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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. Several of these projects support specific Defense Technology Objectives established by the Director, Defense Research and Engineering (DDR&E) and receive a bi-annual technical and programmatic review under DDR&E's Technology Area Review Assessment Program.

UNCLASSIFIED

# UNCLASSIFIED

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

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 PROGRAM ELEMENT: 0603236N      PROGRAM ELEMENT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY  
 PROJECT NUMBER: 2915      PROJECT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY

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
2915 WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY	63,198	65,136	102,124	110,384	118,130	138,420	100,502	76,488

**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 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 2006	FY 2007	FY 2008	FY 2009
<b>SEA BASE PLANNING, OPERATIONS AND LOGISTICS</b>	10,496	11,456	19,083	14,756

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

# UNCLASSIFIED

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PROJECT NUMBER: 2915

PROJECT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY

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 2006 - 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 is required for FY 2008 at-sea demonstrations of Large to Large Vessel Lift on/Lift off crane technologies and for fabrication of large scale Intra-Connector Material Handling technology prototypes in support of FY 2009 at-sea technology demonstrations and program completion.

## **FY 2006 Accomplishments:**

- Continued development of human amplification technologies under the Compact Agile Material movement effort.
- Continued efforts of software development for the afloat component of naval sustainment Command and Control (C2).
- Continued efforts on the Large to Large Vessel Lift on/Lift off capability.
- Completed the automated storage and retrieval efforts via an at-sea shipboard demonstration of the technology.

## **FY 2007 Plans:**

- Continue all efforts of FY 2006 less those noted as completed above.
- Complete the efforts of Compact Agile Material Movement including the human amplification technologies via an at-sea demonstration of the technologies.
- Complete efforts of software development for the afloat component of naval sustainment Command and Control (C2).
- Initiate efforts in the development of Interface Ramp Technologies for seabasing.
- Initiate efforts in the development of Intra-Connector Material Handling cargo securing technologies.

## **FY 2008 Plans:**

- Continue all efforts of FY 2007.

# UNCLASSIFIED

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

	FY 2006	FY 2007	FY 2008	FY 2009
<b>SEA BASE MOBILITY AND INTERFACES</b>	12,014	12,952	28,110	31,231

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 2006 - FY 2009 increases 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. Additionally, in FY 2008 there are several programs that were initiated in FY 2006 and are at the stage within the individual programs 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.

# UNCLASSIFIED

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## **FY 2006 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.
- Initiated efforts to develop technologies for Small to Large At-Sea Vessel Interfaces.
- Initiated the development of concepts for High Rate Horizontal and Vertical Material Movement within the Sea Base.
- Initiated efforts to develop a large scale Axial Flow Waterjet technology.

## **FY 2007 Plans:**

- Continue all efforts of FY 2006.
- Initiate efforts to develop blade control technology for the heavy lift vertical air replacement platform.

## **FY 2008 Plans:**

- Continue all efforts of FY 2007.

## **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.

# UNCLASSIFIED

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	FY 2006	FY 2007	FY 2008	FY 2009
<b>FRICITION DRAG REDUCTION</b>	0	0	2,500	1,203

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 program start up through planned end of program.

**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 at-sea test.
- Initiate and complete data reduction.

	FY 2006	FY 2007	FY 2008	FY 2009
<b>SEA BASING</b>	5,403	6,973	13,821	22,553

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 increase from FY 2006 through FY 2009 is due to the continuation of the FY 2006 efforts for an entire year as well as initiation of new Seabasing efforts. In FY 2008 and FY 2009 this INP plan includes the completion of the development and at-sea testing of the Rapid

# UNCLASSIFIED

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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 (T-CRAFT) Prototype; and the full scale component-level development, evaluation, and testing of critical T-CRAFT technologies.

## **FY 2006 Accomplishments:**

- Completed the first evaluation of seabasing technologies which included: advanced hull forms 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 INP contracts for preliminary designs in the area of a T-CRAFT and a Rapidly Deployable Seabasing Stable Transfer Platform.

## **FY 2007 Plans:**

- Continue all efforts of FY 2006 less those noted as completed 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 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.

R1 Line Item 18

Page 10 of 28

UNCLASSIFIED

# UNCLASSIFIED

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

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	FY 2006	FY 2007	FY 2008	FY 2009
<b>MANPOWER AND PERSONNEL DEVELOPMENT</b>	3,158	5,477	5,138	5,199

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.

The FY 2006 - 2008 profile enables the planned completion of integration projects vital to the Navy's "Strategy for Our People" and the initiation of projects to provide new advanced capabilities for enhanced visibility and control of Manpower and Personnel systems at the individual as well as all levels of command.

#### **FY 2006 Accomplishments:**

- Continued 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.
- Continued advanced development of Cultures and Values Selection for integration with other selection and classification measures.
- Completed Non-Cognitive Measures of Personality and Social Competency related to teamwork, Navy adaptability, leadership, and job performance to be applied in personnel selection and classification.
- Completed Career Case Manager Technologies, which integrates intelligent agents, simulation models, and statistical methods to support Sailor/Marine career planning and decision making.
- Completed Distribution Incentive System, which incorporates the economic methods, business rules, and incentive structures to incentivize traditionally difficult-to-fill assignments or locations.
- Initiated 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).
- Initiated Integrated Sailor/Marine Career Management System, which integrates Career Case Manager Technologies Distribution Incentive System.
- Initiated 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.

# UNCLASSIFIED

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Exhibit R-2a

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PROGRAM ELEMENT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY

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## **FY 2007 Plans:**

- Complete Web Based Marketplace.
- Complete advanced development of Cultures and Values Selection for integration with other selection and classification measures.
- Complete Integrated Whole Person Assessment.
- Complete Integrated Sailor/Marine Career Management System.
- Complete COMPASS.

## **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.

	FY 2006	FY 2007	FY 2008	FY 2009
<b>TRAINING SYSTEMS</b>	12,837	11,003	11,307	10,378

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.

The FY 2006 - 2008 profile enables the planned completion 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.

## **FY 2006 Accomplishments:**

R1 Line Item 18  
Page 12 of 28

# UNCLASSIFIED

# UNCLASSIFIED

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

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- Continued advanced technologies for Interactive Electronic Technical Manuals.
- Continued Virtual Technologies and Environments (VIRTE) Demo III, which provides integrated virtual training across the full spectrum of combat.
- Continued advanced technologies for collaborative network-centric visualization systems.
- Completed debriefing technologies.
- Completed VIRTE Demonstration II, and performance assessment tools.

#### **FY 2007 Plans:**

- Complete advanced technologies for Interactive Electronic Technical Manuals.
- Complete VIRTE Demonstration III.
- Complete 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 advanced technology developments and demonstrations for enabling better warfighter understanding of languages and cultures to enhance their regional expertise.

#### **FY 2009 Plans:**

- Continue all efforts of FY 2008.

	FY 2006	FY 2007	FY 2008	FY 2009
<b>HUMAN SYSTEMS INTEGRATION</b>	0	0	3,848	3,894

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.

# UNCLASSIFIED

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The increase from FY 2007 to FY 2008 is due to reinitiating 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. 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 system is built to accommodate the characteristics of the user population that will operate, maintain, and support the systems. A strong HSI effort must be part of the Capable Manpower Program being initiated for the period FY 2008 - FY 2012.

## **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.

	FY 2006	FY 2007	FY 2008	FY 2009
<b>TURBINE ENGINE TECHNOLOGY - INTEGRATED HIGH PERFORMANCE TURBINE ENGINE TECHNOLOGY (IHPTET)/ VERSATILE AFFORDABLE ADVANCED TURBINE ENGINES (VAATE)</b>	11,226	11,300	11,502	12,712

This activity provides integration and experimental engine testing of new gas turbine engine technologies to

# UNCLASSIFIED

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demonstrate readiness and reduce technical risk for entering engineering development. IHPTET was a Tri-Service program in which each Service contributes established shares of advanced technology funding and laboratory resources to meet specified goals. IHPTET wrapped up in 2006 as the VAATE program stood up and refocused on affordability and integrated propulsion systems goals. This activity covers the Navy's share. The objective of VAATE is to continue the Tri-Service arrangement and develop and demonstrate versatile, durable, "intelligent" engine technologies for the spectrum of legacy, pipeline, and new military aircraft, rotorcraft, missiles, and unmanned air vehicles (UAVs). The VAATE goal is 10X improvement in turbine engine affordability (capability/cost) by 2017, with an interim goal of 6X by 2010.

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

## **FY 2006 Accomplishments:**

- Continued VAATE Phase I: Design, component development, integration and fabrication of Phase I demonstrator engines.
- Completed the Phase III Joint Technology Demonstrator Engine (JTDE) General Electric (GE)/Liberty Works (LW) demonstrator engines.
- Completed the Phase III Joint Turbine Advanced Gas Generator (JTAGG) development and final core test of Honeywell Engine and Systems (HES) demonstrator.

## **FY 2007 Plans:**

- Continue all efforts of FY 2006 less those noted as completed above.
- Initiate assembly, instrumentation, and testing of VAATE Phase I demonstrator engines with GE/LW and Pratt & Whitney (P&W).

## **FY 2008 Plans:**

- Continue all efforts of FY 2007 less those noted as completed above.
- 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.
- Initiate design and fabrication of VAATE Phase II demonstrator engines with GE/LW and P&W.

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## **FY 2009 Plans:**

- Continue all efforts of FY 2008 less those noted as completed above.
- Complete testing of VAATE Phase I demonstrator engines with GE/LW and P&W.

	FY 2006	FY 2007	FY 2008	FY 2009
<b>AIRFRAME/SHIP CORROSION</b>	4,019	3,985	2,315	2,252

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 2006 Accomplishments:**

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

## **FY 2007 Plans:**

- Continue all efforts of FY 2006 less those noted as completed above.
- Complete road test methodology.
- Complete development of NDI technology for metals, composites and structures.
- Complete single coat system for ship tanks (CHT tank).

## **FY 2008 Plans:**

# UNCLASSIFIED

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

DATE: February 2007

BUDGET ACTIVITY: 03

PROGRAM ELEMENT: 0603236N

PROJECT NUMBER: 2915

PROGRAM ELEMENT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY

PROJECT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY

- 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.

	FY 2006	FY 2007	FY 2008	FY 2009
<b>LITTORAL COMBAT</b>	4,045	1,990	4,500	6,206

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 funding profile from FY 2006 to FY 2007 reflects the reorganization of the FNC Program investments into ECs. As a result of this reorganization, the funding for each EC has been aligned to a Budget Activity 2 and Budget Activity 3 PE as appropriate. In FY 2007 and out this activity reflects the alignment of investments for the Battlefield Power EC only. The decrease from FY 2006 to FY 2007 is due to transition of FNC efforts to other PEs. The growth reflects the Battlefield Power refined funding profile from initiation in FY 2007 to FY 2009. 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 2006 Accomplishments:

# UNCLASSIFIED

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

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- Continued integration and demonstration of secure mobile network/wireless LAN technologies. (Realigned to PEs 0602131M/0603640M in FY 2007)
- Continued modeling and testing of the advanced weapon materials technology efforts on the Expeditionary Fires Support System (EFSS) artillery and mortar systems. (Realigned to PEs 0602114N/0603114N in FY 2007)
- Continued development of advanced target acquisition (target hand off and target location) technologies for both mounted and dismounted applications. (Previous effort funded by PE 0603782N) (Realigned to PE 0602114N in FY 2007)
- Continued development of technology to enhance navigation in a Global Positioning System (GPS) denied environment. (Realigned to PEs 0602131M/0603640M in FY 2007)
- Continued development of integrated vehicle self-defense system to defeat incoming Rocket Propelled Grenades (RPGs). (Realigned to PE 0602131M in FY 2007)
- Continued development of lightweight computational fire control interface technology and development and integration of improved fire control systems for direct and indirect fire weapons. (Previous effort funded by PE 0603782N and 0603640M) (Realigned to PE 0602114N in 2007)
- Completed Phase 1 of the PLI system technology development.
- Completed development effort for OLED display technologies.
- Completed development of and transition a capability to rapidly generate a terrain database.

## **FY 2007 Plans:**

- Initiate 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.

## **C. OTHER PROGRAM FUNDING SUMMARY:**

RELATED RDT&E:

# UNCLASSIFIED

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

DATE: February 2007

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## 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 0602236N - Warfighter Sustainment Applied Research  
PE 0603512N - Carrier Systems Development  
PE 0604703N - Personnel, Training, Simulation, and Human Factors  
PE 0605013M - Information Technology Development  
PE 0605152N - Studies and Analysis Support - Navy

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

## D. ACQUISITION STRATEGY:

Not applicable.

# UNCLASSIFIED

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

DATE: February 2007

BUDGET ACTIVITY: 03  
 PROGRAM ELEMENT: 0603236N      PROGRAM ELEMENT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY  
 PROJECT NUMBER: 3008      PROJECT TITLE: HIGH SPEED SEALIFT VESSEL

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
3008 HIGH SPEED SEALIFT VESSEL	648	0	0	0	0	0	0	0

**A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:** Within the Naval Transformation Roadmap, this investment supports the achievement of Compressed Deployment and Employment Times and Enhanced Sea-Borne Positioning of Assets required by Sea Basing.

**B. ACCOMPLISHMENTS/PLANNED PROGRAM:**

	FY 2006	FY 2007	FY 2008	FY 2009
<b>HIGH SPEED VESSEL</b>	648	0	0	0

Within the Naval Transformation Roadmap, this investment supports the achievement of Compressed Deployment and Employment Times and Enhanced Sea-Borne Positioning of Assets required by Sea Basing.

**FY 2006 Accomplishments:**

- Completed replacement of lost and damaged materials for the composite High Speed Vessel caused during Hurricane Katrina.

**C. OTHER PROGRAM FUNDING SUMMARY:**

0601153N - Defense Research Sciences  
 0602123N - Force Protection Applied Research  
 0603123N - Force Protection Advanced Technology  
 0603758N - Navy Warfighting Experiments and Demonstrations

**D. ACQUISITION STRATEGY:**

Not applicable.

# UNCLASSIFIED

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

DATE: February 2007

BUDGET ACTIVITY: 03  
PROGRAM ELEMENT: 0603236N  
PROJECT NUMBER: 9999

PROGRAM ELEMENT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY  
PROJECT TITLE: Congressional Plus-Ups

**CONGRESSIONAL PLUS-UPS:**

	FY 2006	FY 2007
ADAPTIVE IED TACTICAL SYSTEM	0	1,445

This effort supports Adaptive Improvised Explosive Device (IED) Tactical System research.

	FY 2006	FY 2007
ADVANCED COMPOSITE MATERIALS RESEARCH	0	3,238

This effort will enhance the effectiveness of US Forces through experimentally validated design, production, inspection, and repair of tactical and strategic lightweight armored vehicles, aircraft, watercraft and personal armor that will function in severe service environments. The program advances the design and validation of light-weight, durable and safe structures that are functionally appropriate for rugged combat applications and specifically relevant to the needs of the armed services.

	FY 2006	FY 2007
AUTOMATED CONTAINER AND CARGO HANDLING SYSTEM	1,930	0

This effort completed fabrication of the full scale active Autolog spreader bar system and conducted at-sea tests.

	FY 2006	FY 2007
AUTONOMOUS SUSTAINMENT CARGO CONTAINER (ASCC) DELIVERY SYSTEM	973	1,992

FY 2006 - This effort conducted a feasibility design study on use of strap-on propulsion and navigation modules on International Organization of Standardization (ISO) containers for autonomous transfer of cargo from ship to shore.

FY 2007 - This effort is conducting a preliminary design phase for strap-on propulsion and navigation modules on International Organization of

# UNCLASSIFIED

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

DATE: February 2007

BUDGET ACTIVITY: 03

PROGRAM ELEMENT: 0603236N

PROJECT NUMBER: 9999

PROGRAM ELEMENT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY

PROJECT TITLE: Congressional Plus-Ups

Standardization (ISO) containers for autonomous transfer of cargo from ship to shore.

	FY 2006	FY 2007
CURVE PLATE TECHNOLOGY	986	996

FY 2006 - This effort supported curve plate technology research. Designed, fabricated and constructed additional full-scale carbon steel-stainless steel hybrid structural assemblies with installed composite materials. Additionally, this effort focused on refining computer aided manufacturing models and the developmental weld distortion models.

FY 2007 - This effort supports curve plate technology research.

	FY 2006	FY 2007
DAMAGE CONTROL ONBOARD SIMULATION	2,563	0

This project developed just-in-time simulation based refresher training for damage control. This training is directed at refreshing perishable skills and knowledge to significantly enhance the readiness of forward deployed forces, rotating crews, and surge forces.

	FY 2006	FY 2007
DEFENSE SYSTEMS MODERNIZATION AND SUSTAINMENT INITIATIVE	2,874	1,494

FY 2006 - This effort was a process research program for efficiently incorporating new technologies into aging ground and air vehicles and ships. A health monitoring system was installed in Light Armored Vehicles (LAV).

FY 2007 - This effort supports defense systems modernization and sustainment initiative research.

	FY 2006	FY 2007
EXPEDITIONARY CRAFT	8,627	0

This effort designed a demonstration vessel that can transform itself between Small Waterplane Area Twin Hull (SWATH), catamaran, and displacement configurations as missions require. The vessel's design enables good sea

# UNCLASSIFIED

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

DATE: February 2007

BUDGET ACTIVITY: 03  
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PROJECT NUMBER: 9999      PROJECT TITLE: Congressional Plus-Ups

keeping characteristics at high speeds while enabling a shallow draft.

	FY 2006	FY 2007
HEET	4,337	3,188

FY 2006 - This project focused on the development and testing of advanced fuel cell systems and the characterization and utilization of sea-floor based methane hydrates. This program strongly leveraged industrial, government laboratory, and international collaboration to conduct field and laboratory work in fuel cells and methane hydrates, and also conducted an International Workshop on Methane Hydrates.

FY 2007 - This project will develop and test advanced fuel cell systems using hardware in the loop methods, to characterize sea-floor based methane hydrates, and to evaluate the potential for using hydrates as a fuel for undersea fuel cell applications. This effort will leverage industrial, government laboratory, and international collaboration to conduct field and laboratory work in fuel cells and methane hydrates, and will conduct an International Workshop on Methane Hydrates.

	FY 2006	FY 2007
INTEGRATED ASYMMETRIC URBAN WARFARE	936	0

This project supported Science and Technology efforts in the Global War on Terror, specifically for the American warfighters who on a daily basis deal with Improvised Explosive Devices and an anonymous enemy that has a demonstrated capability to quickly adapt to any new warfighting capability that has so far been introduced. It studied and defined the Operational Adaptation Capability Area and identified its Capability Gaps, EC, and supporting projects/reports. A dramatically improved Operational Adaptation capability provides American warfighters with a proactive offensive capability and will place the enemy into a defensive/reactive posture and take away their warfighting initiative.

	FY 2006	FY 2007
INTELLIGENT WORK MANAGEMENT	1,647	1,445

FY 2006 - This effort integrated a knowledge repository, work process automation tool, and maintenance simulation capability into a unified system to coordinate maintenance, resources, personnel and schedule

# UNCLASSIFIED

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

DATE: February 2007

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 PROJECT NUMBER: 9999      PROJECT TITLE: Congressional Plus-Ups

impacts for cost-effective operational maintenance of deployed combat Navy units.

FY 2007 - This effort will expand 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 will expand the applications scheduler using IWM, including areas such as Watch Bill and Long Range Training Plan scheduling the.

	FY 2006	FY 2007
MISSION READINESS ADVANCEMENTS FOR VERTICAL LIFT AIRCRAFT	0	1,445

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

	FY 2006	FY 2007
MOTION-COUPLED VISUAL ENVIRONMENT (MOCOVE)	958	0

This research effort explored the efficacy of several methods of MOCOVE operation through human subject experimentation and provided a report. MOCOVE is a drug free method for controlling the motion sickness of users viewing electronic displays in a motion environment such as on ship, in an aircraft or in a ground combat vehicle.

	FY 2006	FY 2007
NADEP CHERRY POINT CENTER FOR VERTICAL LIFT - INSTITUTE FOR MAINTENANCE SCIENCE AND TECHNOLOGY	0	1,345

This effort will facilitate 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 will be increased readiness by improving maintenance operations and decreasing maintenance cycle times for rotary wing aircraft.

# UNCLASSIFIED

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Exhibit R-2a

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PROJECT NUMBER: 9999

PROGRAM ELEMENT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY

PROJECT TITLE: Congressional Plus-Ups

	FY 2006	FY 2007
NATIONAL CENTER FOR RESEARCH ON EVALUATION, STANDARDS, AND STUDENT TESTING (CRESST) SKILL SET ANALYSIS	4,884	5,180

FY 2006 - This project provided technical support to the Navy's Surface Warfare Officer School's (SWOS) curriculum re-engineering effort by building simulation based prototype lessons, performance based tests, and tools. It also provided a Science and Technology base for development of training materials.

FY 2007 - This effort will provide technical support to SWOS curriculum development by designing building Subject Matter Expert (SME)/instructor user friendly assessment and authoring tools for simulation based instruction. The assessment tools will provide 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.

	FY 2006	FY 2007
ON-DEMAND DISTRIBUTED TRAINING FOR THE WARFIGHTER (ODTW)	0	2,192

This effort will build and demonstrate a prototype onboard mission rehearsal system (software) for damage control for the Littoral Combat Ship.

	FY 2006	FY 2007
ONR VIRTUAL AT SEA TRAINING INITIATIVE	1,455	0

Development of the Virtual At Sea Training system enabled the creation of scenarios and interactions to support advanced training at the unit or joint level at any time or place. The ability to record, analyze and critique combat decisions and courses of action greatly improves training and readiness. Operational training for U.S. Navy and Marine Corps units requires the ability to combine live, virtual and simulated forces in realistic computer-generated environments that can span large geographic regions.

	FY 2006	FY 2007
PHOTONIC MACHINING OF ELECTRONIC MATERIALS	958	996

# UNCLASSIFIED

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

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FY 2006 - This effort developed a production ready precision manufacturing process and capability for critical DoD applications such as semiconductor components. The effort combined emerging "super-pulse" laser cutting technology with expertise in precision motion control and metrology.

FY 2007 - This effort will involve the integration of the previously developed SuperPulse laser system with a high resolution motion-controlled workstation. The work will involve optimization of laser and other processing parameters for machining of high value electronic materials of interest to Navy and DoD. In addition, comparison studies using other laser systems, such as femtosecond laser, will also be carried out.

	FY 2006	FY 2007
PROTECTIVE APPAREL TECHNOLOGY SYSTEMS	2,874	1,992

FY 2006 - This effort developed new light weight personal armor materials, cooling technology for personal armor systems, new personal armor prototypes, and advanced instrumented test surrogates to assess personal armor performance against blast pressure and ballistic injuries to the warfighter.

FY 2007 - This effort will explore novel methods to improve the ballistic performance and strength of hard and soft body armor materials. This will include methods to increase chemical cross-linking of new and existing armor polymers. This effort will also improve the load bearing capability of body armor designs.

	FY 2006	FY 2007
SEAPRINT	0	1,992

This effort supports SEAPRINT research.

	FY 2006	FY 2007
SHIPBOARD PERSONAL LOCATOR BEACON	1,057	1,295

FY 2006 - This project developed a capability for interior tracking of individual personnel based on successful employment of the technology for flight deck and exterior use aboard Navy ships and aircraft carriers. The ability to track individual sailor location aboard ship is explicitly required in DD(X) design criteria and implicitly required for safety, damage control and reduced manning efforts.

# UNCLASSIFIED

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FY 2007 - This effort will develop an evaluation plan to field samples of the Shipboard Personal Locator Beacon on ships and collect experimental data to stress the communications algorithms. The evaluation results will be used to establish real life loading models for the network. These models will then be used to determine if an entire crew's location can be monitored full time and how much condition data can be monitored.

	FY 2006	FY 2007
TRAINING TRANSFORMATION FOR THE LITTORAL COMBAT SHIP	0	996

This effort will design and develop a complementary Littoral Combat Ship (LCS) training system to support trainee throughput using low cost, high fidelity mission modules bridge/navigation, dame control, and maintenance simulators. It will develop high fidelity acoustic propagation/loss models to support Anti-Submarine Warfare (ASW) and Mine Warfare (MIW) mission module training. It will develop combat system graphical user interface and communication system emulators necessary for LCS crew members to conduct individual, team, and integrated team training.

	FY 2006	FY 2007
TRAINING TRANSFORMATION OF THE PACIFIC	0	2,391

This effort will enhance and install ASW helicopter (SH-60B and SH-60F) mission rehearsal tactical team trainers (MRT3) at Kaneohe Bay for use by Pacific Fleet aviators to maintain ASW mission readiness and to participate in Fleet Synthetic Training (FST) exercises. It will design and develop the Toolkit for Medical Modeling (TOMM) to support MARFORPAC and PACOM pandemic modeling requirements. It will transition and integrate 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).

	FY 2006	FY 2007
WIRELESS SENSORS FOR NAVY AIRCRAFT	2,019	0

This effort developed new wireless sensors, with energy harvesting capabilities based on advanced

# UNCLASSIFIED

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Exhibit R-2a

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piezoelectric elements, which will more effectively monitor F/A-18 aircraft usage in order to better predict its remaining structural life.