FY 2006/2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: Feb 2005
Exhibit R-2

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

COST: (Dollars in Thousands)

Project Number & Title	FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
Total PE	87,281	91,665	68,540	82,623	85,106	83,288	74,450	116,141
R2915	WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY							
	54,250	58,974	68,540	82,623	85,106	83,288	74,450	116,141
R9014	PRECISION FABRICATION OF LARGE CURVED STEEL NAVY SHIP STRUCTURES							
	0	1,981	0	0	0	0	0	0
R9021	LOW VOLUME PRODUCTIVITY							
	0	1,485	0	0	0	0	0	0
R9023	INTERMEDIATE MODULUS COTS CARBON FIBER QUALIFICATION							
	1,921	0	0	0	0	0	0	0
R9147	DEFENSE MODERNIZATION AND SUSTAINMENT INITIATIVE							
	1,932	3,963	0	0	0	0	0	0
R9148	EMERGING/CRITICAL INTERCONNECTION TECHNOLOGIES PROGRAM (E/CIT)							
	3,363	0	0	0	0	0	0	0
R9149	ENERGY AND ENVIRONMENTAL TECHNOLOGY							
	4,112	0	0	0	0	0	0	0
R9150	INTEGRATED VEHICLE HEALTH MANAGEMENT SYSTEM							
	4,025	2,576	0	0	0	0	0	0
R9151	CAFFING PROTECTION SYSTEM							
	0	1,388	0	0	0	0	0	0
R9318	AUTOGEN							
	2,887	0	0	0	0	0	0	0
R9319	AUTOMATIC CONTAINER AND CARGO HANDLING SYSTEMS							
	1,937	1,981	0	0	0	0	0	0

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R9320	EXPEDITIONARY LOGISTICS FOR THE 21ST CENTURY (EXLOG21)							
	964	2,972	0	0	0	0	0	0
R9321	EXTREME ENVIRONMENT URBAN WARFARE RESEARCH							
	3,411	0	0	0	0	0	0	0
R9323	HUMAN SYSTEMS INTEGRATION/SEAPRINT							
	972	1,485	0	0	0	0	0	0
R9324	NAVAL MAINTENANCE MANAGEMENT							
	964	0	0	0	0	0	0	0
R9325	ON-LINE ELECTRO-HYDRODYNAMIC FILTER							
	2,887	0	0	0	0	0	0	0
R9326	PHOTONIC MACHINING APPLICATIONS							
	961	0	0	0	0	0	0	0
R9327	REDUCTION OF CATAPULT POST-RETRACTION EXHAUST DISCHARGE							
	961	0	0	0	0	0	0	0
R9328	TITANIUM MATRIX COMPOSITES PROGRAM							
	1,734	0	0	0	0	0	0	0
R9473	ASPHALT RECONDITIONER							
	0	1,684	0	0	0	0	0	0
R9474	HEET							
	0	4,953	0	0	0	0	0	0
R9475	INTELLIGENCE WORK MANAGEMENT							
	0	1,684	0	0	0	0	0	0
R9476	MINE WARFARE TECHNOLOGY SOLUTIONS (MWTS)							
	0	2,576	0	0	0	0	0	0
R9477	NADEP CHERRY POINT CENTER FOR VERTICAL LIFT AIRCRAFT REPAIR AND MAINTENANCE TECHNOLOGY PROGRAM							
	0	1,981	0	0	0	0	0	0
R9479	ULTRASONIC CONSOLIDATION OF MATRIX COMPOSITES							
	0	991	0	0	0	0	0	0

BUDGET ACTIVITY: 03
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R9480	VIRTUAL AT SEA TRAINING INITIATIVE						
	0	991	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 the Future Naval Capabilities (FNC) Program 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. The Expeditionary Logistics investment addresses transformational Naval surface distribution/replenishment techniques, and improves the situational awareness of readiness and operating logistics status.

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.

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

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

PROGRAM CHANGE SUMMARY:

	FY 2004	FY 2005	FY 2006	FY 2007
FY 2005 President's Budget Submission	86,464	61,103	62,693	65,333
Cong Rescissions/Adjustments/Undist. Reductions	0	-2,374	0	0
Congressional Action	0	33,000	0	0
Execution Adjustments	3,100	0	0	0
FNC Realignment	0	0	4,093	4,548
General S&T Reduction	0	0	-7,200	0
Non-Pay Inflation Adjustments	-80	0	2	3
Program Adjustments	0	-64	-121	-123
Program Realignment	0	0	9,066	12,715
Rate Adjustments	0	0	7	147
SBIR Assessment	-2,203	0	0	0
FY 2006/2007 President's Budget Submission	87,281	91,665	68,540	82,623

PROGRAM CHANGE SUMMARY EXPLANATION:
Technical: Not applicable.

Schedule: Not applicable.

BUDGET ACTIVITY: 03
PROGRAM ELEMENT: 0603236N PROGRAM ELEMENT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY
PROJECT NUMBER: R2915 PROJECT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY

COST: (Dollars in Thousands)

Project Number & Title	FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
R2915 WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY	54,250	58,974	68,540	82,623	85,106	83,288	74,450	116,141

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 the Future Naval Capabilities (FNC) Program 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, increased efficiency of future propulsion systems and improved diagnostic tools. The Expeditionary Logistics investment addresses transformational Naval surface distribution/replenishment techniques, and improves the situational awareness of readiness and operating logistics status.

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 2004	FY 2005	FY 2006	FY 2007
SEA BASE PLANNING, OPERATIONS AND LOGISTICS	9,917	12,031	10,379	6,643

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To more accurately group underlying efforts, this activity now includes investments formerly reported under Logistics Command and Control (C2) and Strike Up/Strike Down Selective Offload Systems. This activity includes support to the Future Naval Capabilities (FNC) Enabling Capabilities for Sea Base Collaborative Command and Control; Sea Base Integrated Operations; and Sea Base Mobility and Interfaces. 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 transfer of cargo from shipboard unload/onload point to stowage spaces. Technologies include high-strength composites, ship-motion compensation for force control-based systems, intelligent systems, and robotics.
FY 2004 - FY 2005 increase results from planned initiation of new project.
FY 2005 - FY 2007 decreases result from planned project transitions, especially the automated warehousing.

FY 2004 Accomplishments:

- Continued focus on maturing technology for automated storage and retrieval for Sea Base integrated operations.
- Continued prototype development of a compact agile material mover and an automated warehouse capability for Sea Base platform.
- Completed a prototype logistics C2 software module for ashore units and deployed it to Operation Iraqi Freedom/Operation Enduring Freedom.
- Initiated planning for software development for the afloat component of Naval sustainment C2.

FY 2005 Plans:

- Continue all efforts of FY 2004 less those noted as completed above.
- Initiate new prototype to handle container movement aboard ship.

FY 2006 Plans:

- Continue all efforts of FY 2005 less those noted as completed above.

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FY 2007 Plans:

- Continue all efforts of FY 2006 less those noted as completed above.
- Complete automated warehousing for the Sea Base including a demonstration of integrated operations.

	FY 2004	FY 2005	FY 2006	FY 2007
SEA BASE MOBILITY AND INTERFACES	7,371	8,498	11,881	22,621

To more accurately group underlying efforts, this activity now includes investments formerly reported under At Sea Arrival and Assembly, and Sea Base to Shore Surface Craft. This activity includes support to the Future Naval Capabilities (FNC) Enabling Capabilities for Sea Base Integrated Operations, and Sea Base Mobility and Interfaces. This activity improves the capability for transfer of personnel and cargo between Sea Base/logistics vessels and unimproved beaches during high sea states. Capabilities being developed include propulsion technologies, cargo stabilization technologies, advanced hull form technologies and fabrication of lightweight robust structures needed for sustained operations at high speed in a moderate seaway. This activity further supports the Sea Basing mission of marrying troops to equipment, and providing support to seaborne forces via surface distribution interfaces. It will improve current underway replenishment capabilities for transfer of cargo between Sea Base/logistics vessels (large ship-to-ship) during high sea states, while increasing ship separation for safety.
FY 2004 - FY 2007 increases result from the planned initiation of new projects to support the Navy's developing seabasing concept of operations.

FY 2004 Accomplishments:

- Continued design studies and conducted limited prototyping and model basin testing.
- Continued investment and technology development in ship to ship securing systems and seaway cargo handling technologies.
- Continued development of high capacity at sea transfer capabilities between large afloat vessels from industry, coalition, and Naval forces.
- Completed heavy lift surface transport development and the study of beachable heavy lift surface transport.
- Completed work in heavy lift landing craft air cushion technologies.
- Initiated work in station keeping for two platforms at sea.

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FY 2005 Plans:

- Continue all efforts of FY 2004 less those noted as completed above.
- Complete design studies and conduct limited prototyping and model basin testing.
- Complete work in station keeping and scale demonstrations in a relevant environment.
- Initiate technology exploration in hydrodynamic impacts and design space trade studies.

FY 2006 Plans:

- Continue all efforts of FY 2005 less those noted as completed above.
- Initiate work for a beachable high speed craft as a Sea Base mobility interface.
- Initiate work in small to large at-sea vessel interfaces.
- Initiate work in high rate horizontal and vertical material movement within the Sea Base.

FY 2007 Plans:

- Continue all efforts of FY 2006 less those noted as completed above.
- Initiate work for technology support of the 53X heavy lift vertical air platform Sea Base mobility interface.

	FY 2004	FY 2005	FY 2006	FY 2007
FRICTION DRAG REDUCTION	0	0	0	2,502

This program 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 2006 - 2007 increase due to program start up.

FY 2007 Plans:

- Initiate design of an optimal implementation of additive-based drag reduction technology using large-

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scale predictive models.

	FY 2004	FY 2005	FY 2006	FY 2007
SEA BASING	0	0	5,343	9,339

This activity includes advancement of technologies to support the design and development of Sea Basing Innovative Naval Prototypes. Areas include design and development of various Sea Basing prototypes in the areas of high speed, shallow draft and beachable connectors; vessel to vessel interfaces; and automated and integrated warehousing.
2005 - 2006 increase due to program start up.
2006 - 2007 increase due to initiation of further efforts.

FY 2006 Plans:

• Initiate prototype designs in the areas of high speed, shallow draft and beachable connectors; vessel to vessel interfaces; and automated and integrated warehousing.
• Initiate advanced technology development of selected Sea Basing technologies which would support prototype design. Technologies include: lift cushion seal challenges such as lightweight, high strength, long wear materials; variable geometry/retractability; sea state four capability as well as lighter weight, more efficient lift fans; automatic connector/mating systems; innovative seal systems; vertical/horizontal transition of conveyance and autonomous; and low power consumption intraship transport systems.

FY 2007 Plans:

• Continue all efforts of FY 2006 less those noted as completed above.
• Initiate model demonstration and testing.
• Initiate detailed design of Sea Basing prototypes utilizing selected technologies from FY06 development.

	FY 2004	FY 2005	FY 2006	FY 2007
MANPOWER AND PERSONNEL DEVELOPMENT	4,714	3,123	7,093	6,985

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

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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.
2004 - 2005 decrease due to rebalancing of funds.
2005 - 2006 increase due to planned initiation of integration projects.

FY 2004 Accomplishments:

- Continued Attrition Reduction Technologies, which demonstrate the use of attrition, cultural, and organizational measures between applicants/Sailors and the Navy that can be mitigated.
- Continued 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.
- Continued Career Case Manager Technologies, which integrates intelligent agents, simulation models, and statistical methods to support Sailor/Marine career planning and decision making.
- Continued Distribution Incentive System, which incorporates the economic methods, business rules, and incentive structures to incentivize traditionally difficult-to-fill assignments or locations.
- 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 Enterprise Management System, which provides near-term decision support for personnel policy and resource allocation and long-range personnel enterprise strategic planning “executive simulation”.
- Completed the Enlisted Manpower and Personnel Integrated Planning System (EMPIPS), an integration of compensation models into a decision support system and database for enlisted manpower and personnel planning.

FY 2005 Plans:

- Continue all efforts of FY 2004 less those noted as completed above.
- Complete Attrition Reduction Technologies.
- Complete Enterprise Management System.

FY 2006 Plans:

- Continue all efforts of FY 2005 less those noted as completed above.

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- Complete Non-Cognitive Measures.
- Complete Career Case Manager Technologies.
- Complete Distribution Incentive System.
- Initiate Cultures and Values Selection to measure the practical and predictive validity of socialization measures for selection into the military and assess their potential for classification use.
- Initiate 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).
- Initiate Integrated Sailor/Marine Career Management System, which integrates Career Case Manager Technologies, Distribution Incentive System, and Web-Based Marketplace.
- Initiate Integrated Personnel Situational Monitoring, Analysis, and Response Technologies, which integrates Enlisted Manpower and Personnel Integrated Planning System and Enterprise Management System.

FY 2007 Plans:

- Complete Cultures and Values Selection.
- Complete Integrated Whole Person Assessment.
- Complete Web Based Marketplace.
- Complete Integrated Sailor/Marine Career Management System.
- Complete Integrated Personnel Situational Monitoring, Analysis, and Response Technologies.

	FY 2004	FY 2005	FY 2006	FY 2007
TRAINING SYSTEMS	11,139	13,846	12,694	12,022

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.
2004 - 2005 increase due to rebalancing of funds and the initiation of planned projects.
2005 - 2006 decrease due to planned completion of projects.

FY 2004 Accomplishments:

- Continued debriefing technologies.

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- Continued Battle Group Level Advanced Under Sea Warfare (USW) visualization systems and developed prototype system integrated with Composable FORCEnet.
- Continued focus on Virtual Technologies and Environments (VIRTE) Demonstration II, and performance assessment tools.
- Completed distributed learning guidelines for development of Navy courseware.
- Completed integration of existing technologies to produce an advanced fire support prototype for Virtual At Sea Training (VAST).
- Initiated advanced technologies for Interactive Electronic Technical Manuals.
- Initiated task to evaluate alternative ways to display information in the cockpit to support Naval air combat training in airborne platforms, exploiting the training capabilities offered by VAST.

FY 2005 Plans:

- Continue all efforts of FY 2004 less those noted as completed above.
- Complete development of human performance assessment tools for Navy-wide distributed learning.
- Complete Battle Group Level Advanced Under Sea Warfare (USW) visualization systems.
- Complete alternate cockpit information display evaluations.
- Initiated Virtual Technologies and Environments (VIRTE) Demo III, which provides integrated virtual training across the full spectrum of combat.
- Initiate advanced technologies for collaborative network-centric visualization systems.
- Initiate and complete architecture design for integrating Naval surface fire support and air VAST technologies into a joint operations constellation that includes cross-echelon and multi-platform training.

FY 2006 Plans:

- Continue all efforts of FY 2005 less those noted as completed above.
- Complete debriefing technologies.
- Complete VIRTE Demonstration II.

FY 2007 Plans:

- Complete VIRTE Demonstration III.
- Complete advanced technologies for Interactive Electronic Technical Manuals.

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

	FY 2004	FY 2005	FY 2006	FY 2007
HUMAN SYSTEMS INTEGRATION	1,352	1,249	0	0

This effort supports the warfighter by designing affordable user-centered systems that are easy to use and train. Focus is on the application of a reusable user-centered design process to design a user interface to support user tasks, extract software requirements, and develop software design models.
2005 - 2006 decrease due to program termination.

FY 2004 Accomplishments:

- Continued focus on integration of Human-Computer Interaction (HCI) designs, and software architecture designs for Land Attack systems, specifically the Tactical Tomahawk Weapon Control System (TTWCS) builds.

FY 2005 Plans:

- Complete integration of Land Attack task and HCI designs into TTWCS builds.
- Complete software architecture design to accommodate task-based user interface for Land Attack systems.

	FY 2004	FY 2005	FY 2006	FY 2007
TURBINE ENGINE TECHNOLOGY - INTEGRATED HIGH PERFORMANCE TURBINE ENGINE TECHNOLOGY (IHPTET)/ VERSATILE AFFORDABLE ADVANCED TURBINE ENGINES (VAATE)	9,322	10,646	11,101	11,122

This activity provides integration and experimental engine testing of new gas turbine engine technologies to demonstrate readiness and reduce technical risk for entering engineering development. IHPTET is a tri-service program in which each service contributes established shares of advanced technology funding and laboratory resources to meet specified goals. This activity covers the Navy's share. The objective of VAATE is to 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.

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FY 2004 - FY 2005 increases due to fund planned completions and initiation of follow on projects.

FY 2004 Accomplishments:

- Continued focus on the Phase II & III Joint Technology Demonstrator Engine (JTDE), General Electric (GE)/Allison Advanced Development Company (AADC) and Pratt & Whitney (P&W) demonstrator engines, and Phase III Joint Turbine Advanced Gas Generator (JTAGG) development, and core test Honeywell Engine and Systems (HES) demonstrator.
- Initiated VAATE Phase I: Component design and technology development to meet the VAATE Phase I goals.

FY 2005 Plans:

- Continue all efforts of FY 2004 less those noted as completed above.
- Complete the Phase II JTDE (GE/AADC) demonstrator engine.
- Complete the Phase III JTDE (GE/AADC P&W) demonstrator engines.
- Initiate VAATE Phase I: Design, component development, integration and fabrication of Phase I demonstrator engines.

FY 2006 Plans:

- Continue all efforts of FY 2005 less those noted as completed above.
- Complete the Phase III JTAGG development and final core test of HES demonstrator.

FY 2007 Plans:

- Continue all efforts of FY 2006 less those noted as completed above.
- Initiate testing of VAATE Phase I demonstrator engines with GE and P&W.

	FY 2004	FY 2005	FY 2006	FY 2007
AIRFRAME/SHIP CORROSION	4,967	4,836	3,974	7,984

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

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management technologies. This is particularly significant to life extension for the aging fleet.
FY 2005 - FY 2006 decrease is due to rebalancing of FNC funding.
FY 2006 - FY 2007 increase is to fund planned completions.

FY 2004 Accomplishments:

- Continued Airframe Corrosion effort, development of road test method for Marine Corps vehicles and single coat system for ship tanks (potable water and fuel tanks).
- Completed the development of single coat systems for ship tanks (ballast tank) and demonstrated on 32 ballast tanks, 2 potable water tanks and 4 voids on carrier.
- Completed development of Corrosion and Corrosivity Monitoring System (C2MS) for aircraft.
- Completed construction of Modular Hybrid Pier (MHP) modules for test bed and design of mooring system.
- Initiated the development of Nondestructive Inspection (NDI) Technology for aircraft metal and composite structures to detect cracks and defects.

FY 2005 Plans:

- Continue all efforts of FY 2004 less those noted as completed above.
- Complete single coat system for ship tanks (potable water tank), Corrosion Preventive Compounds (CPCs), and NDI technology for corrosion detection for aircraft structures.
- Initiate the development of single coat systems for Collection-Holding-Transfer (CHT) ship tanks.
- Initiate NDI technology for heat damage detection on composite materials.

FY 2006 Plans:

- Continue all efforts of FY 2005 less those noted as completed above.
- Complete single coat system for ship tanks (fuel tank).

FY 2007 Plans:

- Complete single coat system for ship tanks (CHT tank).
- Complete road test methodology.
- Complete development of NDI technology for aircraft metal and composite structures for cracks and

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defects.
• Complete NDI technology for heat damage detection on composite materials.

	FY 2004	FY 2005	FY 2006	FY 2007
SMART WIRING	542	0	0	0

Smart Wiring is a subset of the Total Ownership Cost (TOC) Future Naval Capability (FNC). Smart Wiring develops flight-qualified smart aircraft wiring system hardware and performs required flight demonstrations. Smart wiring reduces wiring maintenance man-hours, reduces wiring induced mission aborts and non-mission capable hours, and reduces in-flight electrical fires and subsequent loss of aircraft.

FY 2004 Accomplishments:

• Completed Smart wires flight development/test/certification.

	FY 2004	FY 2005	FY 2006	FY 2007
LITTORAL COMBAT	3,678	4,745	6,075	3,405

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. This activity includes support to the Future Naval Capabilities (FNC) Enabling Capabilities for: Reduce 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, Reduce Cost of Operations 1, Sea Base Collaborative Command and Control, Sea Base Mobility and Interfaces, and Sea Base Integrated Operations.
FY 2004 - FY 2005 funding increase due to program growth.
FY 2005 - FY 2006 funding increase due to program maturation, testing, and demonstrations.
FY 2006 - FY 2007 funding decrease due to program transitions.

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FY 2004 Accomplishments:

- Continued Position Location Information (PLI) Phase 1, including capability to develop algorithms for indirect fires effects.
- Continued development of innovative relays (Beyond Line of Sight (BLOS))in the areas of wideband communications between command posts and narrowband communications between maneuver elements and their headquarters.
- Continued integration and demonstration of secure mobile network/secure wireless Local Area Network (LAN) technologies, including advanced protocols, frequency conversion and power amplification.
- Completed industry survey and initiated service coordination effort for Organic Light Emitting Diode (OLED) display technologies.
- Initiated development of a capability to rapidly generate a terrain database for use in simulations for evaluation of maneuver plans.
- Initiated efforts on network management tools to increase the reliability and availability of tactical networks by improving network performance and security. (FY05 effort funded by PE 0602131M).

FY 2005 Plans:

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

BUDGET ACTIVITY: 03
PROGRAM ELEMENT: 0603236N PROGRAM ELEMENT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY
PROJECT NUMBER: R2915 PROJECT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY

FY 2006 Plans:

- Continue development of innovative relays (BLOS) communications. (FY07 effort to be funded by PE 0603640M)
- Continue integration and demonstrations of secure mobile network/secure wireless LAN technologies.
- Continue testing of the advanced weapon materials technology efforts on EFSS artillery and mortar systems.
- Continue development of advanced target acquisition technologies (target hand off and target location).
- Continue development of integrated vehicle self-defense system to defeat incoming RPGs.
- Continue development of technology to enhance navigation in a GPS denied environment.
- Continue development and integration of improved fire control systems for direct and indirect fire weapons. (FY07 effort funded by PE 0603782N)
- Continue development of lightweight computational fire control interface technology. (Previous effort funded by PE 0603782N; FY07 effort to be funded by PE 0603782N)
- Complete Phase 1 of the PLI system technology development and initiate Phase 2.
- Complete development effort for OLED display technologies.
- Complete development of and transition a capability to rapidly generate a terrain database.

FY 2007 Plans:

- Continue development of integrated vehicle self-defense system to defeat incoming RPGs.
- Continue development of technology to enhance navigation in a GPS denied environment.
- Complete integration and demonstration of secure mobile network/wireless LAN technologies.
- Complete testing of the advanced weapon materials technology efforts on the EFSS artillery and mortar systems.
- Complete development and transition of advanced Naval fires target acquisition technologies

	FY 2004	FY 2005	FY 2006	FY 2007
CONSUMPTION REDUCTION	1,248	0	0	0

This effort provided technologies and processes for managing shipboard logistics across the spectrum of the Sea Based forces, to Navy and Marine Corps logistics needs. Energy production and storage and advanced

BUDGET ACTIVITY: 03
PROGRAM ELEMENT: 0603236N PROGRAM ELEMENT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY
PROJECT NUMBER: R2915 PROJECT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY

materials formed the technology foundation.

FY 2004 Accomplishments:

- Completed blast mitigation advanced materials packaging modeling, development, testing, and evaluation.

C. OTHER PROGRAM FUNDING SUMMARY:
RELATED RDT&E:

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.

BUDGET ACTIVITY: 03
PROGRAM ELEMENT: 0603236N PROGRAM ELEMENT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY
PROJECT NUMBER: R9150 PROJECT TITLE: INTEGRATED VEHICLE HEALTH MANAGEMENT SYSTEM

Project Number & Title	FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
R9150 INTEGRATED VEHICLE HEALTH MANAGEMENT SYSTEM	4,025	2,576	0	0	0	0	0	0

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Interactive Multisensor Analysis Training (IMAT) project is aimed at improving the preparation of operational users of undersea-warfare sensor systems. IMAT provides exploratory environments in which operators and tacticians examine the effects of change in any of the variables involved in the end-to-end sequence of emission, transmission, reflection, and detection. Sensor settings, environmental conditions and target characteristics can all be modified through a "what-if" simulation approach. The effort focuses on training technology at the battlegroup, fleet, and theater levels.

Note: Integrated Vehicle Health Management System (FY04 $2,460; FY 2005 $2,576) and On-Line Electro-Hydrodynamic Filter ($2,887) are discussed in the Congressional Plus-Ups section.

B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 2004	FY 2005	FY 2006	FY 2007
INTERACTIVE MULTISENSOR ANALYSIS TRAINING (IMAT)	1,565	0	0	0

The Interactive Multisensor Analysis Training (IMAT) project developed improved training technologies for anti-submarine warfare (ASW) in support of Sea Warrior, Sea Shield, and Pacific Fleet requirements.

FY 2004 Accomplishments:

- Completed the development and application of IMAT techniques for visualization-based training.

BUDGET ACTIVITY: 03
PROGRAM ELEMENT: 0603236N PROGRAM ELEMENT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY
PROJECT NUMBER: R9150 PROJECT TITLE: INTEGRATED VEHICLE HEALTH MANAGEMENT SYSTEM

C. OTHER PROGRAM FUNDING SUMMARY:
RELATED RDT&E:

NAVY RELATED RDT&E:
PE 0206624M - Marine Corps Combat Services Support
PE 0601152N - In-House Laboratory Independent Research
PE 0601153N - Defense Research Sciences
PE 0602236N - Warfighter Sustainment Applied Research
PE 0604703N - Personnel, Training, Simulation, and Human Factors
PE 0605152N - Studies and Analysis Support, Navy

NON NAVY RELATED RDT&E:
PE 0601102A - Defense Research Sciences
PE 0603007A - Manpower, Personnel and Training Advanced Technology
PE 0601102F - Defense Research Sciences

D. ACQUISITION STRATEGY:
Not applicable.

BUDGET ACTIVITY: 03
PROGRAM ELEMENT: 0603236N PROGRAM ELEMENT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY
PROJECT NUMBER: Various PROJECT TITLE: Congressional Plus-Ups

CONGRESSIONAL PLUS-UPS:

R9014	FY 2004	FY 2005
PRECISION FABRICATION OF LARGE CURVED STEEL NAVY SHIP STRUCTURES	0	1,981

FY05: This effort will use precision fabrication of large curved steel beams in the application of new concepts of hybrid stainless steel/composite construction to Navy ship structures. Hybrid ship construction will provide low magnetic signatures, increased survivability, low maintenance, and light weight for high speed ships for Littoral Combatant Ship applications. Application of precision fabrication using computer controlled welding and metrology to control weld distortions are key to low cost manufacturing.

R9021	FY 2004	FY 2005
LOW VOLUME PRODUCTIVITY	0	1,485

FY05: This effort will establish a laser repair facility which is fully robotic and which uses a higher power laser than was previously available. Such a facility enables the economical repair of shipboard components which are likely to reach a navy repair facility in very small numbers (frequently "one of a kind").

R9023	FY 2004	FY 2005
INTERMEDIATE MODULUS COTS CARBON FIBER QUALIFICATION	1,921	0

FY04: This effort developed a high volume manufacturing technique for production of intermediate modulus (IM) carbon fibers that will be incorporated into strong lightweight polymer composites. This material enabled the development of advanced, lightweight, long-range Navy aircraft such as the Joint Strike Fighter.

R9147	FY 2004	FY 2005
DEFENSE SYSTEMS MODERNIZATION AND SUSTAINMENT INITIATIVE	1,932	3,963

FY04: This effort conducted systems modernization, readiness assessment and tracking in four specific focus areas: Material Aging; Life Cycle Engineering and Economic Decision Systems; Asset Health Management; and

BUDGET ACTIVITY: 03
PROGRAM ELEMENT: 0603236N PROGRAM ELEMENT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY
PROJECT NUMBER: Various PROJECT TITLE: Congressional Plus-Ups

Reliability, Availability and Maintainability Initiatives.

FY05: The Asset Health Management area will be expanded from the single vehicle to the fleet level through co-funding with the Marine Corps Warfighting Laboratory. Integration of the system into Intelligent Maintenance will begin. Prognostic sensing and assessment technologies will be expanded to electronic components. The effort will develop the required reverse engineering/restoration technology for critical legacy components for ground and air vehicles.

R9148	FY 2004	FY 2005
EMERGING/CRITICAL INTERCONNECTION TECHNOLOGY	3,363	0

FY04: This effort facilitated solutions to current military problem areas and evaluated leading edge design and manufacturing technologies for both future military and commercial requirements prior to adoption by printed circuit board manufacturers.

R9150	FY 2004	FY 2005
INTEGRATED VEHICLE HEALTH MANAGEMENT SYSTEM	2,460	2,576

Note: This effort was previously titled "Integrated Aircraft Health Management".

FY04 - This effort initiated the development of data interoperability software tools, diagnostic algorithms, and processes to ensure improved affordability and safety through the application of integrated aircraft health management practices.

FY05 - This effort will demonstrate data interoperability software tools and diagnostic algorithms on F/A-18 E/F flight control actuators and propulsion system, as well as select C-17, V-22 and/or commercial platform systems. The technology will enable reduced operating costs through life-extension of legacy systems and will enable improved diagnostic tools that will decrease the number of unnecessary parts removals.

BUDGET ACTIVITY: 03
PROGRAM ELEMENT: 0603236N PROGRAM ELEMENT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY
PROJECT NUMBER: Various PROJECT TITLE: Congressional Plus-Ups

R9151	FY 2004	FY 2005
CAFFING PROTECTION SYSTEM	0	1,388

FY05: This effort will develop and transition a condition based monitoring technology for onboard detection, diagnostics, and prognostics of wire chaffing onboard Navy aircraft. The main tasks will be to flight test a current prototype onboard an H-53 helicopter, and to enhance a previously developed prototype by increasing its sensitivity and reducing the interrogation time. Decaying, aged wiring is an insidious and usually unseen problem to aircraft maintainers and operators. With most aircraft wiring hidden from view, an enabling technology to detect wiring faults prior to electrical malfunction is urgently needed. Wiring defects are most often initially manifested by chaffing, followed by cumbersome, costly and time consuming repair.

R9318	FY 2004	FY 2005
AUTOGEN	2,887	0

FY04: This effort supported the commercialization phase to parallelize multi-processor driven applications for next generation shipbuilding.

R9319	FY 2004	FY 2005
AUTOMATIC CONTAINER AND CARGO HANDLING SYSTEMS	1,937	1,981

FY04: This effort produced a scaled demonstration of a multi-point control system and mast system for cargo transfer of containers at sea, in up to sea state 5.

FY05: This effort will design, fabricate, and test a full scale active AutoLog spreader bar system for lifting containers and cargo while at sea.

R9320	FY 2004	FY 2005
EXPEDITIONARY LOGISTICS FOR THE 21ST CENTURY (EXLOG21)	964	2,972

FY04: This effort completed work on a software prognostic vehicle health monitoring system, focused on the engine and drive train, to accurately forecast readiness posture. This effort also initiated the Material Control Officer (MATCONOFF) software development project Space and Warfare Systems office PMW 151.

BUDGET ACTIVITY: 03
PROGRAM ELEMENT: 0603236N PROGRAM ELEMENT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY
PROJECT NUMBER: Various PROJECT TITLE: Congressional Plus-Ups

FY05: This effort will complete the MATCONOFF software development and transition the product to PMW 151.

R9321	FY 2004	FY 2005
EXTREME ENVIRONMENT URBAN WARFARE RESEARCH	959	0

FY04: This effort conducted research to determine the possibilities of modeling the effects of one or many extreme environmental conditions (heat, cold, wind, darkness, altitude, high or low humidity, etc.) on human physiology, psychology, and performance.

R9321	FY 2004	FY 2005
FLIGHT/HANGER DECK CLEANER IMPROVEMENTS	2,452	0

FY04: This effort developed a full scale prototype of a deck scrubber for Naval platform flight decks, suited for removing oils and exhaust without damage to the non-skid deck plate and with low environmental disposal impact.

R9323	FY 2004	FY 2005
HUMAN SYSTEMS INTEGRATION/SEAPRINT	972	1,485

Note: This effort was previously titled "IMPRINT".

FY04: This effort completed and tested Human Systems Integration (HSI) specifications adopted from Army MANPRINT technology. It tested HSI tenets for performance improvements on a Navy platform.

FY05: This effort will include additional test platforms to ascertain performance outcomes: controlling for cognitive and non-cognitive factors for each test subject group. Also there will be an inclusion of meta-heuristic optimization algorithms to ascertain optimal performance outcomes subject to varying HSI tenets and test platforms.

BUDGET ACTIVITY: 03
PROGRAM ELEMENT: 0603236N PROGRAM ELEMENT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY
PROJECT NUMBER: Various PROJECT TITLE: Congressional Plus-Ups

R9324	FY 2004	FY 2005
NAVAL MAINTENANCE MANAGEMENT	964	0

FY04: This effort focused on streamlining required maintenance and predicting failures so prevention maintenance can be performed.

R9325	FY 2004	FY 2005
ON-LINE ELECTRO-HYDRODYNAMIC FILTER	2,887	0

FY04: This effort performed innovative research and product development in two areas: oil quality sensing using broadband electrochemical impedance and oil filtering system based on dielectrophoresis filtering technology.

R9326	FY 2004	FY 2005
PHOTONIC MACHINING APPLICATIONS	961	0

FY04: This effort supported machining small features for micro-electronics using the Femto Second Laser.

R9327	FY 2004	FY 2005
REDUCTION OF CATAPULT POST-RETRACTION EXHAUST DISCHARGE	961	0

FY04: This effort supported development of a dry lubricant for aircraft carrier catapult hardware and combined this technology with the capability to wirelessly monitor the health of the components lubricated.

R9328	FY 2004	FY 2005
TITANIUM MATRIX COMPOSITES PROGRAM	1,734	0

FY04: This effort developed a lightweight produciable composite metal for key components of the joint strike fighter, to include candidates of the engine and hook components.

BUDGET ACTIVITY: 03
PROGRAM ELEMENT: 0603236N PROGRAM ELEMENT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY
PROJECT NUMBER: Various PROJECT TITLE: Congressional Plus-Ups

R9473	FY 2004	FY 2005
ASPHALT RECONDITIONER	0	1,684

FY05: This effort will facilitate the application of GSB-88, which is a complex asphalt emulsion product specifically engineered to retard surface oxidation of asphalt pavement; monitor the performance of GSB-88 to prevent premature oxidation and corrosion of the asphalt infrastructure;
and assess cost savings in asphalt preservation cost.

R9474	FY 2004	FY 2005
HEET	4,112	4,953

Note: This effort was previously titled "Energy and Environmental Technology".

FY04: This effort tested and developed advanced fuel cell systems for military and civilian application, and explored and characterized sea-floor methane hydrates as a potential fuel source. In FY04 it completed the Third International Workshop of Methane Hydrate Research and Development in Vina del Mar Chile and participated in an international research expedition on the Cascadia Margin off the Coast of British Columbia, Canada. The effort also established official collaboration with the Naval Underwater Warfare Center (NUWC) Hawaii. Accomplishments under the methane hydrates activity included the exploration and characterization of new methane hydrate beds, implementation of international partnerships and workshops, and development of a state-of-the-art laboratory to characterize hydrate properties.

FY05: This effort will continue its partnership with the Naval Research Laboratory to test and develop advanced fuel cell systems for military and civilian application, and to explore and characterize sea-floor methane hydrates as a potential fuel source. The fuel cell activity will focus on the development of strong industrial partnerships providing access to state-of-the-art-fuel cells, and the use of the laboratory facility to characterize the performance and durability of cells and cell components for Navy applications.

BUDGET ACTIVITY: 03
PROGRAM ELEMENT: 0603236N PROGRAM ELEMENT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY
PROJECT NUMBER: Various PROJECT TITLE: Congressional Plus-Ups

R9475	FY 2004	FY 2005
INTELLIGENCE WORK MANAGEMENT	0	1,684

FY05: This effort will develop network technologies to significantly increase the speed and efficiency by which shipboard maintenance problems are identified, replacement parts are located, and maintenance personnel are assigned to address the problems.

R9476	FY 2004	FY 2005
MINE WARFARE TECHNOLOGY SOLUTIONS (MWTS)	0	2,576

FY05: This effort will support the development of metrics; analysis tools; and the assessment engineering concepts, processes, systems, and technologies for mine countermeasures missions. This effort will emphasize the use of unmanned surface vehicles for mine countermeasures missions.

R9477	FY 2004	FY 2005
NADEP CHERRY POINT CENTER FOR VERTICAL LIFT AIRCRAFT REPAIR AND MAINTENANCE TECHNOLOGY PROGRAM	0	1,981

FY05: This effort will provide for 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.

R9479	FY 2004	FY 2005
ULTRASONIC CONSOLIDATION OF MATRIX COMPOSITES	0	991

FY05: This effort will research new composite materials to be used in advanced munitions.

BUDGET ACTIVITY: 03
PROGRAM ELEMENT: 0603236N PROGRAM ELEMENT TITLE: WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY
PROJECT NUMBER: Various PROJECT TITLE: Congressional Plus-Ups

R9480	FY 2004	FY 2005
VIRTUAL AT SEA TRAINING INITIATIVE	0	991

FY05: This effort will extend the Virtual At Sea Training (VAST) system to new warfighting arenas including battlegroup level ASW training and mission rehearsal, and Marine Corps indirect fire weapons training for the full artillery team.