FY 2002 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: June 2001

BUDGET ACTIVITY: 3 PROGRAM ELEMENT: 0603236N
PROGRAM ELEMENT TITLE: Warfighter Sustainment Advanced Technology

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 2000 ACTUAL	FY 2001 ESTIMATE	FY 2002 ESTIMATE
R2915 Warfighter Sustainment Advanced Technology	**	**	57,685

**The Science and Technology Program Elements (PEs) were restructured in FY 2002. The work described in FY 2000 and 2001 was funded in PEs 0603217N, 0603707N, 0603712N and 0603792N.

(U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This PE supports: a) the Integrated Warfare Architecture (IWAR) Support Areas for Manpower and Personnel, Training, and Readiness; b) the IWAR Mission Areas; c) the Future Joint Warfighting Capabilities identified by the Joint Chiefs of Staff; and d) the Future Naval Capabilities (FNC) for Capable Manpower, Total Ownership Cost Reduction, Expeditionary Logistics, and Warfighter Protection. It develops technologies that enable the Navy to recruit, select, classify, assign and manage its people; to train effectively and affordably in classroom settings, in simulated environments and while deployed; to effect human systems integration into weapon systems. Other technologies developed in this PE enable reduced operating costs through life-extension of legacy systems, increased efficiency of future propulsion systems and improved diagnostic tools.

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

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is budgeted within the ADVANCED TECHNOLOGY DEVELOPMENT Budget Activity because it encompasses design development, simulation, or experimental testing of prototype hardware to validate technological feasibility and concept of operations and reduce technological risk prior to initiation of a new acquisition program or transition to an ongoing acquisition program.

FY 2002 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: May 2001

BUDGET ACTIVITY: 3 PROGRAM ELEMENT: 0603236N PROGRAM ELEMENT TITLE: Warfighter Sustainment Advanced Technology

PROJECT NUMBER: R2915 PROJECT TITLE: Warfighter Sustainment Advanced Technology

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) MANPOWER AND PERSONNEL DEVELOPMENT: This project 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. Fleet readiness can be enhanced and personnel costs reduced via such technologies as modeling and simulation, mathematical optimization, advanced testing, statistical forecasting, information visualization, data warehousing, date cleansing, web-based knowledge management, and human performance measurement.

MANPOWER & PERSONNEL DEVELOPMENT	FY00	FY01	FY02-$3,145
Initiate	• Enlisted Manpower and Personnel Integrated Planning System (EMPIPS) • Optimizing Personnel Classification; Combating Attrition Through Job Satisfaction (RIDE) • Skill Assessment, Training, Evaluation and Assistance for Navy Recruiters (STEAR) • Manpower Implications of Advertising to Target Markets (TAMI) • Training Continuum and Readiness Modeling (TCARM)	• Navy Compensation Decision Support System	• Integrated Whole Person Assessment to reduce unwanted attrition and increase career satisfaction, retention, and fleet readiness • Integrated Sailor/Marine Career Management System to place the right person in the right job with the correct training in a timely fashion • Integrated Personnel Situation Monitoring, Analysis, and Response Technologies to enable personnel managers to overcome emerging personnel critical skill shortages, assess alternative personnel policies, and maximize personnel readiness
Continue	• Comprehensive Officer Force Management Environment (COFME)	• COFME • EMPIPS • RIDE • STEAR • TCARM	• Navy Compensation Decision Support System • RIDE

Complete	• Enlisted Strategic Planning and Assessment (ESPA) • Distribution 2000 Prototype (D2K)	• TAMI	• COFME • EMPIPS • RIDE • STEAR • TCARM

(U) TRAINING SYSTEMS: This project improves mission effectiveness and safety by applying both simulation and instructional technology to the design of affordable education and training methods and systems. The project develops and evaluates systems to improve basic through advanced individual and team training, skill maintenance, and mission rehearsal capability. It improves training efficiency and cost-effectiveness by applying operations research, modeling and simulation, and instructional, cognitive, and computer sciences to the logistics, development, delivery, evaluation, and execution of training.

TRAINING SYSTEMS	**FY00**	**FY01**	**FY02-$19,192**
Initiate	• Synthetic Cognition for Operations Team Training (SCOTT)		• Prototype Authoring Capabilities for Developing Pedagogically Sound Advanced Distributed and Distance Learning • Objective-Based On-the-Job Training and Maintenance Support for Individuals and Teams: 1) transfer of expertise through improved mentoring activity, enhanced embedded scenario-based distributed team training; 2) improved maintenance training; and 3) support using advanced intelligent tutoring systems, diagnostic sensor data and interactive electronic technical manuals • Prototype Virtual Technology/Environments for realistic Landing Craft Air Cushion (LCAC) and Advanced

			Amphibious Assault Vehicle (AAAV) simulators for coordination among crew for driving and fighting vehicles to maintain and enhance combat readiness
Continue	• Deployable Sonar Operator Training (DSOT) • Conning Officer Virtual Environment (COVE) • Tactical Readiness Instruction (TRIADS) • Computer Simulation Based Training System with Intelligent Tutoring Components (CSITS) • Intelligent Exercise Planning and Control Agents (IEPCA) • Transportable Strike/Assault Rehearsal (TSTARS) • Damage Control Assessment & Intelligent Tudor	• SCOTT • DSOT	• DSOT • SCOTT
Complete		• CSITS • COVE • Tactical Decision Making (TDM) • TSTARS	

(U) HUMAN SYSTEMS INTEGRATION (HSI): This project supports the design of affordable warfighter-centered systems, organizations and jobs by applying knowledge of human capabilities, limitations and needs. Project focus will be on selection/training criteria and validation and the development of engineering support tools to enable human-centered design.

FY 2002 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: May 2001

BUDGET ACTIVITY: 3 PROGRAM ELEMENT: 0603236N PROGRAM ELEMENT TITLE: Warfighter Sustainment Advanced Technology

PROJECT NUMBER: R2915 PROJECT TITLE: Warfighter Sustainment Advanced Technology

HUMAN SYSTEMS INTEGRATION	FY00	FY01	FY02-$434
Initiate			• Development of a Prototype Advanced Land Attack Console Employing Human-Centric Design Principles
Continue	• Ship Manpower Analysis and Requirements Tool (SMART) • Advanced Alerting (ADAL) • Display and User Enhancement Technology for Systems (DUETS) • Sonar Workstation (SW)	•	
Complete		• SW • SMART • ADAL • DUETS	

(U) INTEGRATED HIGH PERFORMANCE TURBINE ENGINE TECHNOLOGY (IHPTET): This project covers the Navy's share of the demonstrator engine efforts under the Department of Defense (DoD)/National Aeronautics and Space Administration (NASA)/Industry IHPTET program, ensuring that Navy unique design and operational requirements are met. The program funds three demonstrator engine classes. Each engine class has specific performance goals that are divided into multiple phases. Phase II is currently progressing to the engine demonstration phase. The Phase III concepts were developed and have been initiated. The phase goals of each engine class are listed as follows and are referenced to a 1987 baseline (additional affordability goals have been developed for fighter/attack and turboprop/shaft classes):

- (U) Fighter/attack (Joint Technology Demonstrator Engine (JTDE)):
  - Phase II - 1997: +60% thrust/weight (Fn/Wt), +200^{o}F combustor inlet temperature (CIT), +600^{o} F turbine inlet temperature (TIT), -20% acquisition cost, -20% maintenance cost, -30% fuel burn.
  - Phase III - 2005: +100% Fn/Wt, +400^{o}F CIT, +900^{o} F TIT, -35% acquisition cost, -35% maintenance cost, -40% fuel burn.

- (U) Turboprop/shaft (Joint Turbine Advanced Gas Generator (JTAGG)):
  - Phase II - 1997: +80% shaft horsepower/weight (SHP/Wt), -30% specific fuel consumption (SFC), +600°F TIT, -20% acquisition cost, -20% maintenance cost.
  - Phase III - 2003: +120% SHP/Wt, -40% SFC, +1000°F TIT, -35% acquisition cost, -35% maintenance cost.
- (U) Missile/expendable engines (Joint Expendable Turbine Engine Concepts (JETEC)):
  - Phase II - 1997: +70% Fn/Wt, -30% SFC, +1200°F CIT, +900 °F TIT, and -45% Cost.
  - Phase III - 2003: +100% thrust/airflow (Fn/Wa), -40% SFC, +1400 °F CIT, +1400°F TIT, -60% Cost.

- (U) Each engine company (Allison Advanced Development Company (AADC) (IN), Honeywell International Engines and Systems (HES) (formerly AlliedSignal Engines) (AZ), General Electric (GE) (OH & MA), Pratt & Whitney (P&W) (CT & FL), Teledyne Continental Motors Engine Division (formerly Teledyne Ryan Aeronautical) (OH) and Williams International (WI) (MI)) attempts to utilize at least two engine builds or demonstrator tests within each Phase to demonstrate the performance goals.

IHPTET	FY00	FY01	FY02-$10,409
Initiate	• Phase III JETEC (AADC)	• Phase III JTDE (P&W) Goal Demo	
Continue	• Phase III JTDE (P&W) Interim • Phase III JTDE (GE/AADC) • Phase II JTDE (GE/AADC) • Phase II JTAGG (HES) • Phase III JTAGG (GE/HES) • Phase II JETEC (AADC) • Phase III JETEC (WI) • Phase III JETEC (HES)	• Phase III JTDE (GE/AADC) • Phase II JTDE (GE/AADC) • Phase III JTAGG (GE/HES) • Phase II JETEC (AADC) • Phase III JETEC (WI) • Phase III JETEC (HES) • Phase III JETEC (AADC)	• Phase III JTDE (P&W) Goal Demo • Phase III JTDE (GE/AADC) • Phase II JTAGG (HES) • Phase III JTAGG (GE/HES) • Phase III JETEC (WI) • Phase III JETEC (HES) • Phase III JETEC (AADC)
Complete	• Phase II JTDE (P&W) • Phase II JETEC (WI) • Phase II JTAGG (HES) Initial Build • Phase II JETEC (AADC) Initial Build	• Phase II JTAGG (HES) • Phase III JTDE (P&W) Interim Build	• Phase II JETEC (AADC) Goal Demo • Phase II JTDE (GE/AADC) Goal Demo

FY 2002 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: May 2001

BUDGET ACTIVITY: 3 PROGRAM ELEMENT: 0603236N PROGRAM ELEMENT TITLE: Warfighter Sustainment Advanced Technology PROJECT NUMBER: R2915 PROJECT TITLE: Warfighter Sustainment Advanced Technology

(U) CORROSION CONTROL: This effort includes an integrated approach for the control of the effects of external and internal corrosion in airframes. The work develops advanced, cost effective prevention and lifecycle management technologies. This is particularly significant to life extension for the aging fleet.

AIRFRAME CORROSION	FY00	FY01	FY02-$3,144
Initiate			• Single Coat Systems for Ship Tanks • Airframe Corrosion • Modular Hybrid Pier

(U) SMART SYSTEMS: This project develops flight qualified smart wire system hardware and performs a flight demonstration. Smart wiring embeds diagnostic and prognostic technologies into aircraft wiring systems to manage wiring system health. The goals of smart wiring are (1) reduce wiring maintenance man-hours by 20%, (2) reduce wiring induced mission aborts and non-mission capable hours by 20%, and (3) reduce in-flight electrical fires and subsequent loss of aircraft by 80%.

SMART WIRING	FY00	FY01	FY02-$2,494
Initiate			• Develop updated requirements document for smart wiring system • Award and execute contract to develop safety-of-flight qualified hardware for smart wiring system • Bench and Engine Test the Total Oil Monitoring System

(U) EXPEDITIONARY LOGISTICS: This project represents the 6.3 investment strategy supporting the Expeditionary Logistics FNC. The FNC is broken into three enabling capabilities covering distribution, Command and Control, and readiness. Work areas encompass surface replenishment and activities within ship to shore material distribution. Additionally, Command and Control of ground logistics is addressed including decision support and battlefield sensor arrays. This program supports the technology maturation, demonstration and transition line.

EXPEDITIONARY LOGISTICS	FY00	FY01	FY02-$16,265
Initiate		• Create decision support technologies for Log C2 Course of Action (COA) generation • FY02-07 Program Planning for surface distribution including development of metrics, exit criteria and technology risk management	• Shipboard strike up/down for carriers and logistics ships • Underway replenishment including station keeping and load control technologies • Log battlefield sensor arrays • Operational Logistics modeling and simulation
Continue			• Ground Logistics Command and Control with situational awareness and course of action tools

(U) ADVANCED SHIPBOARD CRANE MOTION SYSTEM Advanced Technology Demonstration (ATD): The Advanced Shipboard Crane Motion System ATD will demonstrate a crane control system that combines recent advances in nonlinear control system technologies with existing strategic Auxiliary Crane Ship electro-hydraulic cranes. The control scheme will control load pendulation through sea state three by applying nonlinear control algorithms, appropriate to the ship motion environment, to the shipboard crane control system and the crane operator commands. This technology will extend the capability for ship to lighterage transfer of expeditionary warfare logistics to at least 300 containers per day in sea state three.

ADVANCED SHIPBOARD CRANE MOTION SYSTEM ATD	FY00	FY01	FY02-$2,602
Initiate	• Advanced Shipboard Crane Motion Control System ATD. Objective is to demonstrate a pendulation control system for shipboard cranes that will permit ship-to-shore transfer of logistics through sea state three. Completed modeling and		

	simulation-based design evaluations.		
Continue		• Advanced Shipboard Crane Motion Control System ATD. Complete procurement/ fabrication of sensor and control package. Install crane simulator/trainer for military operator training. Conduct demonstration of test ship roll simulation system.	
Complete			• Advanced Shipboard Crane Motion Control System ATD – Pendulation control system demonstrated at pierside, at anchor, and at sea during military exercise.

(U) PROGRAM CHANGE SUMMARY:

	FY 2000	FY 2001	FY 2002
FY 2001 President's Budget			00
Appropriated Value			
Adjustments from FY 2001 President's Budget			
PE Restructure			57,712
NMCI Reimbursable Adjustment			+77
NWCF Rate Adjustment			-108
Non-Pay Inflation			+75
Minor Adjustment			-71
FY 2002 President's Budget Submission	**	**	57,685

**The Science and Technology Program Elements (PEs) were restructured in FY 2002. The work described in FY 2000 and 2001 was funded in PEs 0603217N, 0603707N, 0603712N and 0603792N.

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: Not Applicable.
(U) Schedule: Not Applicable.

FY 2002 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: May 2001

BUDGET ACTIVITY: 3 PROGRAM ELEMENT: 0603236N PROJECT NUMBER: R2915
PROGRAM ELEMENT TITLE: Warfighter Sustainment Advanced Technology PROJECT TITLE: Warfighter Sustainment Advanced Technology

(U) OTHER PROGRAM FUNDING SUMMARY:

(U) NAVY RELATED RDT&E:

(U) PE 0601153N Defense Research Sciences
(U) PE 0602123N Force Protection Applied Research
(U) PE 0602236N Warfighter Sustainment Applied Research
(U) PE 0604703N Personnel, Training, Simulation, and Human Factors

(U) NON NAVY RELATED RDT&E:

(U) PE 0601102A Defense Research Sciences
(U) PE 0602211A Aviation Technology
(U) PE 0603003A Aviation Advanced Technology
(U) PE 0603007A Manpower, Personnel and Training Advanced Technology
(U) PE 0601102F Defense Research Sciences
(U) PE 0602203F Aerospace Propulsion
(U) PE 0603202F Aerospace Propulsion Subsystems Integration
(U) PE 0603216F Aerospace Propulsion and Power Technology
(U) PE 0603227F Personnel, Training and Simulation Technology

(U) SCHEDULE PROFILE: Not applicable.