

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 2

PROGRAM ELEMENT: 0602233N

PROGRAM ELEMENT TITLE: Human Systems Technology

(U) COST: (Dollars in thousands)

PROJECT NUMBER & ACTUAL	FY 1999 ACTUAL	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Human Systems Technology	33,790	30,417	30,939	31,898	29,452	29,358	28,922	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This program element (PE) provides generic affordable technologies in support of: a) the Integrated Warfare Architecture (IWAR) Support Areas for Manpower & Personnel, Training, Readiness, and Technology; b) all the IWAR Mission Areas; and c) the Future Naval Capabilities (FNCs) for Decision Support Systems, Capable Manpower, Total Ownership Cost Reduction, and Warfighter Protection. The IWAR Support Areas encompass requirements for manning, operating, and maintaining fleet assets and for providing the necessary training to maintain operating forces in a high state of readiness. The PE also supports the Joint Warfare Strategy "Forward...From the Sea" as well as three of the "Top Five" Future Joint Warfighting Capabilities identified by the Joint Chiefs of Staff -- in particular, capabilities related to: a) conducting limited-objective warfare (e.g., technology for enhancing the performance of special forces personnel, aiding decision makers in highly ambiguous situations, and improving casualty care); b) promptly engaging regional forces worldwide (e.g., technology for deployable training and mission rehearsal); and c) countering weapons of mass destruction (e.g., technology for responding to chemical and biological threats). This PE encompasses the following areas:

(U) Personnel, Training, and Human Factors technologies enhance the Navy's ability to select, assign, and manage its people; to train effectively and affordably in classroom settings, in simulated environments, and while deployed; and to operate effectively in the complex, high-stress, information-rich and ambiguous environments of modern warfare. Technology development in these areas responds to a variety of requirements, including: providing more affordable approaches to

R-1 Line Item 9

Budget Item Justification
(Exhibit R-2, page 1 of 22)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 2

PROGRAM ELEMENT: 0602233N

PROGRAM ELEMENT TITLE: Human Systems Technology

training and skill maintenance; managing the force efficiently and maintaining readiness with fewer people and smaller budgets; providing warfighting capabilities optimized for low-intensity conflict and littoral warfare; and operating and maintaining increasingly sophisticated weapons systems.

(U) Medical technologies increase cost savings; improve safety and enhance personnel performance capabilities under adverse conditions; enhance diagnosis of medical emergencies and treatment of casualties; and prevent costly occupational injury and disease in hazardous environments. Requirements which support technology development in these areas include: improving warfighting capabilities through enhanced supply and long-term storage of prepositioned medical supplies such as blood; providing better stress endurance/control for key personnel; and providing enhanced casualty care onboard amphibious casualty receiving ships.

(U) This PE also seeks to strengthen the educational pipeline vital for maintaining a strong technology development capability, by supporting programs at a wide range of educational institutions, including Historically Black Colleges & Universities, and other Minority Institutions. In addition, the PE provides funding for the Navy Science Assistance Program, (NSAP) the purpose of which is to improve the ability of the Navy's science and technology community to respond rapidly to urgent fleet needs. Programs in this PE are jointly planned in the Reliance process with the Air Force and Army via panels of the Joint Directors of Laboratories, the Training & Personnel Systems Science & Technology Evaluation and Management Committee, and the Armed Services Biomedical Research Evaluation and Management Committee.

(U) Due to the volume and diversity of efforts included in this PE, the programs described in the Accomplishments and Plans sections are representative selections of work performed in this PE.

(U) The Navy S&T program includes projects that focus on or have attributes that enhance the affordability of warfighting systems.

R-1 Line Item 9

Budget Item Justification
(Exhibit R-2, page 2 of 22)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 2

PROGRAM ELEMENT: 0602233N

PROGRAM ELEMENT TITLE: Human Systems Technology

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is budgeted within the Applied Research Budget Activity because it investigates technological advances with possible applications toward solution of specific Naval problems, short of a major development effort.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) FY 1999 ACCOMPLISHMENTS:

- (U) PERSONNEL, TRAINING AND HUMAN FACTORS TECHNOLOGY:

- Initiated:

- (U) experiments with terrain data to systematically investigate the human performance benefit of Perspective View Technology (PVT) displays for operators and decision makers.
- (U) evaluation of knowledge management tools and agent-base software for the collection, filtering, fusion and presentation of open-source data.
- (U) assessment of the United States Marine Corps (USMC) command post Tactical Decision making performance under conditions of uncertainty using dynamic tactical scenarios.
- (U) development of distributed debriefing capability for network centric warfare in an information intense environment.
- (U) design, development, and evaluation of Direct Perception display formats for aircraft navigation instruments.
- (U) development of visual attention shift scenarios and experiments for studying operator-alerting mechanisms for critical event management under conditions of reduced manning.

R-1 Line Item 9

Budget Item Justification
(Exhibit R-2, page 3 of 22)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 2

PROGRAM ELEMENT: 0602233N

PROGRAM ELEMENT TITLE: Human Systems Technology

- (U) development of cohort database for screening procedures that can predict those individuals who are disqualified from submarine service at some time after completion of Basic Enlisted Submarine School (BESS) for motivational, psychological, or performance related grounds.
- (U) multi-player business simulation game exercise for a selected cadre of Navy manpower, force structure, and acquisition participants.
- (U) development of a distributed battlespace simulation research facility and identification of principles for training distributed teams.
- (U) investigation of applications of cognitive/perceptual models of performance and cognitive task analysis in simulation-based environments and instructional systems.
- (U) interactive electronic technical manuals and advanced interactive augmentation strategies for technical training and aiding.
- Continued:
 - (U) development and evaluation of unconventional visual, auditory and haptic cueing techniques to enhance learning of complex perceptual-motor skills.
 - (U) feasibility evaluation of continuous speech recognition technology for the development of a virtual instructor for training complex team skills.
 - (U) evaluation of the tactical Response Planner and Manager (RPM) monitoring display with full scale prototype at Surface Warfare Officer School (SWOS) Department Head School.
 - (U) development of human-relations skills test items as part of effort to identify, develop and validate multimedia tests that can predict important military behavior including academic and non-academic attrition, and other measures of military success.
 - (U) design and development of new visual presentation schemes and testing on sample users.
 - (U) development of computer-based tools to improve the Navy's force management capabilities and development of an integrated personnel distribution model.

R-1 Line Item 9

Budget Item Justification
(Exhibit R-2, page 4 of 22)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 2

PROGRAM ELEMENT: 0602233N

PROGRAM ELEMENT TITLE: Human Systems Technology

- (U) development of a testbed for examining principles of collaborative decision making in knowledge-rich Collaborative Media System environments.
- (U) establishment of empirical link between mentoring and re-enlistment intentions, and development and testing of a strategy for structured peer mentoring.
- Completed:
 - (U) demonstration and evaluation of large flat panel displays for use in aviation mission planning, mission rehearsal, and training systems.
 - (U) development of design guidelines for a Combat Supervisory Support System (CSSS) that provides for reduced shipboard manning and increased automation, and supports the use of reconfigurable, collaborative task teams.
 - (U) collection of flight simulator navigation performance data to support development of a computational model of Direct Perception.
 - (U) evaluation of the effect of PVT in a 3 dimensional (3D) tactical terrain understanding.
 - (U) documentation of the effect of uncertainty on tactical decision making in land warfare.
 - (U) development of new mathematical algorithms to address two persistent training problems associated with course scheduling and booking of training seats.
 - (U) validated a model of ship readiness to improve the Navy's ability to predict fleet readiness based on training and manpower resources expended.
 - (U) development of Automated Task Analysis Tool allowing subject matter experts to articulate tactical knowledge through scenario design.
 - (U) incorporation of continuous learning concepts into ATGLANT shipboard training and VS-41 training.
 - (U) development and testing of SALIANT - a tool for measuring situational awareness; laboratory evaluation of instructional strategies and measurement techniques for aircrew situational awareness.

R-1 Line Item 9

Budget Item Justification
(Exhibit R-2, page 5 of 22)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 2

PROGRAM ELEMENT: 0602233N

PROGRAM ELEMENT TITLE: Human Systems Technology

- (U) laboratory investigations that demonstrated combined contributions of integrated instructional strategies and decision support aiding in Combat Information Center (CIC), and that validated guidelines, metrics and tools to dynamically assess tactical decision-making.
- (U) laboratory evaluations of instructional strategies for scenario-based training.
- (U) design of scaleable architecture for distributed interactive simulation and adaptation to high-level architecture networks; development of software tools (Simulation Middleware Object Classes).
- (U) development and demonstration of tactical acoustic signal processing in real-time with commercial off-the-shelf hardware.

- (U) MEDICAL TECHNOLOGY:
 - Initiated:
 - (U) comparison of commercially available fluids in an animal model of combined hemorrhage and head injury.
 - (U) maintenance of optimal physiological and cognitive function in cold environments - effects of tyrosine administration.
 - (U) development of multiple biosensor signal integrator for detection of toxic substances.
 - (U) investigation of effects of sopite syndrome on operational performance.

 - Continued:
 - (U) investigation of evoked otoacoustic emissions as replacement for pure-tone audiometry to measure hearing loss.
 - (U) investigation of selected methods for measuring electrophysiological-, cellular-, and molecular-level neurotoxicant effects for further development and incorporation into neuro-molecular toxicity assessments.

R-1 Line Item 9

Budget Item Justification
(Exhibit R-2, page 6 of 22)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 2

PROGRAM ELEMENT: 0602233N

PROGRAM ELEMENT TITLE: Human Systems Technology

- (U) development of supportive resuscitation fluids that minimize tissue damage and facilitate stabilization of hemorrhagic and burn casualties.
 - (U) research and development of therapeutic regimens/modalities that prevent reperfusion injuries after combat trauma and hemorrhage.
 - (U) development of immune modulators for prevention of multiple organ failure.
 - (U) studies on submarine watchstanding regimen for enhanced performance of submariners.
 - (U) studies on assessment of spatial thinking abilities in submarine personnel to develop novel command and control interfaces. Initial studies completed on required spatial abilities.
 - (U) undersea medicine programs that lead to preventive and treatment methods for oxygen toxicity and enhanced protocols for improving submarine rescue scenarios and special warfare operations.
 - (U) investigation of operational durability of G-tolerance due to pilot down time.
 - (U) demonstration of the effectiveness of antioxidant rescue of noise induced hearing loss.
 - (U) mechanism research to prevent performance decrements during military operations in extreme environments implementing biomedical and pharmacologic interventions.
 - (U) research in chronic or high pulse exposure to induced body currents from radio frequency radiation and develop techniques to ameliorate adverse human health effects through physical and/or biological protections.
- Completed:
- (U) identification of mechanisms involved in hyperbaric oxygen-induced seizure genesis; electrophysiological mechanisms and brain structures mediating the onset of hyperbaric oxygen convulsions identified. Transitioned to large animal hyperbaric oxygen toxicity model.
 - (U) study on countermeasures to physical performance decrements in special operations. Studies reported on time course of muscle glycogen supercompensation and effects of depletion exercise.
 - (U) second phase of testing of oral interleukin-6 for prevention of intestinal ischemia following hemorrhage.

R-1 Line Item 9

Budget Item Justification
(Exhibit R-2, page 7 of 22)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 2

PROGRAM ELEMENT: 0602233N

PROGRAM ELEMENT TITLE: Human Systems Technology

- (U) evaluation of interleukin-11 for preservation of intestinal barrier function following hemorrhage
- (U) optimization of trans-croctinate delivery following hemorrhage.
- (U) research to identify biomarkers of cardiac sensitization associated with exposure to refrigerants and fire suppression materials and to develop preventive measures; determine applicability of heart rate variability analysis to identifying adverse impact of toxicants.

- (U) NSAP:

- (U) identified specific solutions to known operational capability needs and provided the means to develop and demonstrate prototype systems. This program supported the conversion of the Dakota Unmanned Autonomous Vehicle (UAV) engine to run on heavy fuel in support of the UAV payload work being done for CINCUSNAVEUR, COMSIXTHFLT, and COMNAVAIRLANT. Developed options for COMSUBPAC for submarines to support COMSEVENTHFLT Counter-Special Operation Forces operations. Demonstrated Total Asset Visibility during a Maritime Prepositioning Force Offload for COMMARFORPAC. Developed and demonstrated technology for SSNs to perform calibrated acoustic measurements of specific underwater signals of interest for COMSUBPAC.
- (U) supported operational commands in Command, Control, Communications, Computers, Intelligence Surveillance & Reconnaissance (C4ISR) for deployed assets. This program supported an Emitter Ambiguity Resolution Study for COMUSNAVCENT, the development and demonstration of Crisis Action Planning and Execution tools for USCINCPAC, and the development and demonstration of an Automated Communications Intercept and Direction Finding System for COMUSNAVCENT.

R-1 Line Item 9

Budget Item Justification
(Exhibit R-2, page 8 of 22)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 2

PROGRAM ELEMENT: 0602233N

PROGRAM ELEMENT TITLE: Human Systems Technology

- (U) provided support to the Fleet/Force in high life cycle cost maintenance areas through application of innovative technologies to reduce maintenance frequency and manpower intensiveness. This program supported the demonstration and evaluation of a means to reduce High Mobility Medium Wheel Vehicle (HMMWV) box frame corrosion for COMMARFORLANT and COMMARFORPAC. NSAP also formed a tiger team to demonstrate and evaluate new coatings onboard the COMSIXTHFLT Command Ship, USS LASALLE. In addition, the program partnered with the ONR Condition Based Maintenance (CBM) program to support development of Condition-Based Maintenance tools that will reduce life cycle maintenance costs aboard US Navy ships.

(U) FY 2000 PLAN:

- (U) PERSONNEL, TRAINING AND HUMAN FACTORS TECHNOLOGY:

- Initiate:

- (U) development and evaluation of 3D PVT strike warfare scenarios.
- (U) evaluation of cognitive process models, to include influence nets and computational methods, for application to decision support in conditions of uncertainty and incomplete information.
- (U) demonstration of After Action Review (AAR) principles in Joint Service exercises.
- (U) evaluation of an advanced processor for speech recognition.
- (U) experimental evaluation of visual attention shift mechanisms for console operators.
- (U) development of dynamic threat assessment storyboard and implementation of display in Lightweight Extensible Information Framework (LEIF).
- (U) comprehensive investigation of first-term attrition in DoD, helping the Navy understand and manage attrition; document the steps a recruit goes through, from initial contact with the Navy to their first duty station.

R-1 Line Item 9

Budget Item Justification
(Exhibit R-2, page 9 of 22)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 2

PROGRAM ELEMENT: 0602233N

PROGRAM ELEMENT TITLE: Human Systems Technology

- (U) development of enhanced modeling techniques for representing the effects of training in computer generated forces (CGF).
- (U) examination of various training strategies for large, distributed teams; development of measures of effectiveness (MOEs) and measures of performance (MOPs).
- (U) development and evaluation of computer-based Cognitive Task Analysis (CTA) Case Resource Tool.
- Continue:
 - (U) development and evaluation of unconventional visual, auditory and haptic cueing techniques to enhance learning of complex perceptual-motor skills.
 - (U) evaluation of application of reconfigurable organizational design methods to the analysis of effective command and control decision-making in an open-source environment.
 - (U) dynamic assessment and feedback on Tactical Decision performance.
 - (U) demonstration of the efficacy of a framework that specifies how different types of knowledge are presented to decision makers to foster development of appropriate knowledge structures.
 - (U) general investigation of applied Human Factors in the design of interactive information management and interactive display technology to support decision-making.
 - (U) development of distributed debriefing capability for network centric warfare in an information intense environment.
 - (U) examination of the predictive capability of commercially available psychological screening tools designed to measure trait characteristics of personality and adjustment disorders and substance abuse.
 - (U) development of integrated personnel model to include personnel projection.
 - (U) development and evaluation of real-time, automated, scenario-based instruction for tactical decision making.
 - (U) experiments on using Collaborative Media Systems.

R-1 Line Item 9

Budget Item Justification
(Exhibit R-2, page 10 of 22)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 2

PROGRAM ELEMENT: 0602233N

PROGRAM ELEMENT TITLE: Human Systems Technology

- (U) laboratory evaluation of the utility of specific CTA approaches for instructional systems development.
- (U) longitudinal investigations of the development of decision-making skills using advanced interactive augmentation strategies, methods, and tools.
- (U) integration of human cognitive and behavioral representations within CGF as simulated teammates and intelligent adversaries.
- (U) development and evaluation of field diagnostic and performance aids for maintenance.
- (U) incorporate Career History Archival Medical and Personnel (CHAMPS) data file into cohort database and statistically identify predictors for various Submarine Service disqualification classifications.
- Complete:
 - (U) experiments to systematically investigate the human performance benefit of 3D PVT display features in tactical environments.
 - (U) feasibility evaluation of continuous speech recognition technology for the development of a virtual instructor for training complex team skills.
 - (U) evaluation of design guidelines for a CSSS that provides for reduced shipboard manning and increased automation, and supports the use of reconfigurable, collaborative task teams using tactical scenarios.
 - (U) development of a research plan, outlining the steps necessary for development of a fully implemented version of a SimNavy/ManPower Policy simulation environment.
 - (U) laboratory evaluation of prototype human-relations skills test in a broader context of other social intelligence and non-cognitive measures.
 - (U) development of graphical presentation techniques that effectively convey to the user the interpretation of the personnel data being displayed.
 - (U) transition of a structured peer mentoring strategy to a navy platform.

R-1 Line Item 9

Budget Item Justification
(Exhibit R-2, page 11 of 22)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 2

PROGRAM ELEMENT: 0602233N

PROGRAM ELEMENT TITLE: Human Systems Technology

- (U) establishment of a distributed battlespace simulation research facility for CGF.
- (U) development of testbed for examining principles of collaborative decision making in knowledge-rich Collaborative Media System environments.

- (U) MEDICAL TECHNOLOGY:

- Initiate:

- (U) evaluation of potassium adenosine tri-phosphate (ATP) channel blocker in hemorrhagic shock.
- (U) evaluation of trans-croceteinate in combined hemorrhage and trauma.
- (U) comparison of commercially available colloidal fluids in model of combined hemorrhage and trauma.
- (U) investigation of methods for grouping chemicals and identifying most appropriate surrogate for toxicity studies of complex mixtures such as jet fuels (JP-8).
- (U) investigation of the role of glutamate receptors and glutamate modulation in mechanisms and prevention of oxygen toxicity.
- (U) evaluation of prophylactic agents for management of oxygen toxicity - initial focus on evaluation of antioxidative agents.
- (U) investigation of medical, aptitude, and personality tradeoffs for selection.
- (U) development of pilot prediction system.
- (U) development of gender-neutral standards for garment-borne cooling for heat-stress environments.
- (U) investigation of: a) alternate techniques to freeze platelets, b) stability of red blood cell membranes during freeze drying, and c) freeze dried platelet function and stability.
- (U) development of a new hybrid instrument system, easy to operate by untrained personnel, for early and rapid detection of environmental pathologic bacterial and viral agents, by harnessing technological components currently available in governmental, academic and private industry laboratories.

R-1 Line Item 9

Budget Item Justification
(Exhibit R-2, page 12 of 22)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 2

PROGRAM ELEMENT: 0602233N

PROGRAM ELEMENT TITLE: Human Systems Technology

- Continue:

- (U) investigation of evoked otoacoustic emissions as replacement for pure-tone audiometry to measure hearing loss.
- (U) development of proof of concept model of multiple biosensor signal integrator, begin field testing to evaluate performance outside of laboratory conditions.
- (U) investigation of selected methods for measuring electrophysiological-, cellular-, and molecular-level neurotoxicant effects for further development and incorporation into neuro-molecular toxicity assessments.
- (U) examination of supportive resuscitation fluids that minimize tissue damage and facilitate stabilization of hemorrhagic and burn casualties.
- (U) evaluation of therapeutic regimens/modalities that prevent shock after combat trauma and hemorrhage.
- (U) investigation of commercially available colloidal fluids in model of combined hemorrhage and trauma.
- (U) evaluation of immune modulators for prevention of multiple organ failure.
- (U) development of neuromodulators for therapy of non-freezing cold injury.
- (U) development of mission preparation and body protection countermeasure techniques to minimize effects of pulsed radiowave energy.
- (U) research on operational durability of G-tolerance due to pilot down time.
- (U) investigation of pharmaceutical rescue of noise-induced hearing loss.
- (U) research on cognitive spatial abilities in submarine personnel.
- (U) research on improving submariner performance through new watchstanding protocols.
- (U) research on tyrosine administration to prevent performance decrements in cold operational environments.

R-1 Line Item 9

Budget Item Justification
(Exhibit R-2, page 13 of 22)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 2

PROGRAM ELEMENT: 0602233N

PROGRAM ELEMENT TITLE: Human Systems Technology

- Complete:
 - (U) research on chronic or high pulse exposure to induced body currents from RF radiation; development of techniques to ameliorate adverse human health effects through physical and/or biological protections.
 - (U) report on suitability of porcine cardiac sensitization model as alternative to canine model, for consideration by the appropriate regulatory agency as standardized test system more predictive of human effects.
 - (U) testing of interleukin 6 as therapeutic for hemorrhage.
 - (U) testing of nerve growth factor in non-freezing cold injury.
 - (U) testing of guanidine derivative for preservation of mitochondrial function in uncontrolled hemorrhage.
- (U) NSAP:
 - Continue:
 - (U) providing support to the operational Commands in C4ISR for deployed assets.
 - (U) providing support to the Fleet/Force in high life cycle cost maintenance areas through application of innovative technologies to reduce maintenance frequency, manpower intensiveness.
 - (U) identifying specific solutions to known operational capability needs and provide the means to develop and demonstrate prototype systems.

(U) FY 2001 PLAN:

R-1 Line Item 9

Budget Item Justification
(Exhibit R-2, page 14 of 22)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 2

PROGRAM ELEMENT: 0602233N

PROGRAM ELEMENT TITLE: Human Systems Technology

- (U) PERSONNEL, TRAINING AND HUMAN FACTORS TECHNOLOGY:

- Initiate:

- (U) development of alternative alerting systems for critical event management in CICs.
- (U) testing of LEIF supported Threat Assessment algorithms for Anti-Air Warfare (AAW).
- (U) development of techniques to enable managers to gain insight into the modeling process in the normal course of using a model.
- (U) exploration of improvements to current econometric modeling techniques.
- (U) refinement of data mining and statistical techniques for identifying and correcting data errors.
- (U) experiments to determine training effectiveness of improved behavioral representations in CGF.

- Continue:

- (U) development and evaluation of unconventional visual, auditory and haptic cueing techniques to enhance learning of complex perceptual-motor skills.
- (U) evaluation of 3D PVT strike warfare display prototype and documentation of display feature guidelines.
- (U) evaluation of the collaborative aspects of cognitive function allocation for establishment of a virtual distributed command presence.
- (U) general investigation of applied Human Factors in the design of interactive information management and interactive display technology to support decision-making.
- (U) development of a descriptive theory of 2D and 3D PVT.
- (U) implementation of AAW threat assessment displays in LEIF.
- (U) development of attrition instruments and evaluation with respect to their interrelationships, and relationships with social, personality, and intellectual measures as well as demographic indices.

R-1 Line Item 9

Budget Item Justification
(Exhibit R-2, page 15 of 22)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 2

PROGRAM ELEMENT: 0602233N

PROGRAM ELEMENT TITLE: Human Systems Technology

- (U) validation of improved human cognitive and behavioral modeling techniques within computer generated forces.
- (U) empirical testing of different strategies and guidelines for training members of large, distributed teams.
- (U) investigations of advanced interactive augmentation strategies, methods, and tools to support transfer of decision making skills from less to more complex tasks.
- Complete:
 - (U) test and evaluation of AAR principles in Joint Service exercises, and generation of guidelines, transitions and lessons learned for AAR.
 - (U) evaluation of tools and methods to produce visualization of open-source data that are consistent with cognitive knowledge processing.
 - (U) evaluation of an advanced processor for speech recognition.
 - (U) dynamic assessment and feedback on Tactical Decision performance.
 - (U) demonstration of distributed debriefing capability for network centric warfare in an information intense environment.
 - (U) demonstration of the efficacy of a framework that specifies how different types of knowledge are presented to decision makers to foster development of appropriate knowledge structures.
 - (U) demonstration of the effectiveness of visual attention shift mechanisms in shipboardcritical event management.
 - (U) evaluation of LEIF implementation of RPM displays and AAW Threat Assessment algorithms.
 - (U) validation of screening procedures to identify individuals unsuitable for submarine service before entry into Basic Enlisted Submarine School.
 - (U) validation of integrated personnel model to include aggregated personnel inventory and flows for attrition, promotion, accession, classification, skill training, rotation, distribution, advanced skill training, deployment and unit readiness.

R-1 Line Item 9

Budget Item Justification
(Exhibit R-2, page 16 of 22)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 2

PROGRAM ELEMENT: 0602233N

PROGRAM ELEMENT TITLE: Human Systems Technology

- (U) evaluation of scenario-based instructional systems for tactical decision making; transition the results to a Navy team trainer.
- (U) documentation of collaborative media system guidelines and principles.
- (U) development of Computer-based CTA Case Resource Tool; guidelines and lessons learned on the utility of CTA approaches for instructional systems development.
- (U) demonstration of automated, realistically behaving simulated forces in virtual and constructive simulations for training, mission planning and rehearsal, and analysis.
- (U) laboratory evaluations of field diagnostic and performance aids for maintenance.

- (U) MEDICAL TECHNOLOGY:
 - Initiate:
 - (U) investigation of health effects/hazards posed by exposure to Very Low Frequency radiowave energy.
 - (U) investigation of hyperbaric oxygen seizure risk using nonlinear dynamical systems theory.
 - (U) pharmacological interventions to maintain optimal operational performance in stressful environments.

 - Continue:
 - (U) investigation of selected methods for measuring electrophysiological-, cellular-, and molecular-level neurotoxicant effects for further development and incorporation into neuro-molecular toxicity assessment battery to screen chemicals of operational concern.
 - (U) investigation of supportive resuscitation fluids that minimize tissue damage and facilitate stabilization of hemorrhagic and burn casualties.
 - (U) development of therapeutic regimens/modalities that prevent shock after combat trauma and hemorrhage.

R-1 Line Item 9

Budget Item Justification
(Exhibit R-2, page 17 of 22)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 2

PROGRAM ELEMENT: 0602233N

PROGRAM ELEMENT TITLE: Human Systems Technology

- (U) investigation of potassium ATP channel blocker in hemorrhagic shock.
- (U) evaluation of trans-crocetinate in combined hemorrhage and trauma.
- (U) further investigation of: a) alternate techniques to freeze platelets, b) stability of red blood cell membranes during freeze drying, and c) freeze dried platelet function and stability.
- (U) testing of immune modulators for prevention of multiple organ failure.
- (U) development of neuromodulators for therapy of non-freezing cold injury.
- (U) development of mission preparation and body protection countermeasure techniques to minimize effects of pulsed radiowave energy.
- (U) research on durability of G-tolerance due to pilot down time.
- (U) investigation of pharmaceutical rescue of noise-induced hearing loss.
- (U) investigation of the role of oxygen inhibition of brain glutamate decarboxylase and alterations of brain glutamate receptors in genesis of oxygen-induced convulsions.
- (U) investigation of medical, aptitude, personality tradeoffs for selection.
- (U) development of pilot prediction system.
- (U) development of gender-neutral standards for garment-borne cooling for heat-stress environments.
- Complete:
 - (U) investigation of effects of sopite syndrome on operational performance.
 - (U) investigation of evoked otoacoustic emissions as replacement for pure-tone audiometry to measure hearing loss.
 - (U) development and field testing of proof of concept model of multiple biosensor signal integrator.
 - (U) investigation of methods for grouping chemicals and identifying most appropriate surrogate for toxicity studies of complex mixtures such as jet fuels (JP-8).
 - (U) industrial transition of trans-crocetinate as additive for resuscitation fluid.
 - (U) testing of interleukin 11 as therapeutic for hemorrhage.
 - (U) testing of potassium ATP channel blocker in hemorrhagic shock.

R-1 Line Item 9

Budget Item Justification
(Exhibit R-2, page 18 of 22)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 2

PROGRAM ELEMENT: 0602233N

PROGRAM ELEMENT TITLE: Human Systems Technology

- (U) studies on submarine watchstanding protocols.
- (U) studies of cognitive spatial abilities in submarine personnel.
- (U) investigation of tyrosine utilization to prevent performance decrements in cold environments.

- (U) NSAP:

- Continue:

- (U) providing support to the operational Commands in C4ISR for deployed assets.
 - (U) providing support to the Fleet/Force in high life cycle cost maintenance areas through application of innovative technologies to reduce maintenance frequency, manpower intensiveness.
 - (U) identifying specific solutions to known operational capability needs and provide the means to develop and demonstrate prototype systems.

R-1 Line Item 9

Budget Item Justification
(Exhibit R-2, page 19 of 22)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 2

PROGRAM ELEMENT: 0602233N

PROGRAM ELEMENT TITLE: Human Systems Technology

B. (U) PROGRAM CHANGE SUMMARY:

	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>
FY 2000 President's Budget	31,426	30,586	29,631
Appropriated Value	-	30,586	-
Adjustments from FY 2000 PRESBUDG			
Biological Hazard Detection System Earmark		+6,000	
Core Project Reduction		-6,000	
SBIR/STTR Transfer	-388	-	-
Various Rate Adjustments	-144	-	-
Execution Adjustments	+2,896	-	-
Congressional Rescissions	-	-169	-
Minor Program Adjustments	-	-	+1,647
Various Rate Adjustments	-	-	-339
FY 2001 President's Budget Submission	33,790	30,417	30,939

(U) CHANGE SUMMARY EXPLANATION:

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E:

(U) PE 0601152N In-House Laboratory Independent Research

R-1 Line Item 9

Budget Item Justification
(Exhibit R-2, page 20 of 22)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 2

PROGRAM ELEMENT: 0602233N

PROGRAM ELEMENT TITLE: Human Systems Technology

- (U) PE 0601153N Defense Research Sciences
- (U) PE 0602232N Communications, Command and Control, Intelligence, Surveillance & Reconnaissance (C3ISR)
- (U) PE 0603706N Medical Development (Advanced)
- (U) PE 0603707N Manpower, Personnel and Training Advanced Technology Development
- (U) PE 0602202F Human Effectiveness Applied Research
- (U) PE 0602716A Human Factors Engineering Technology
- (U) PE 0602785A Manpower, Personnel and Training Technology
- (U) PE 0602787A Medical Technology

(U) This PE adheres to Tri-Service Reliance Agreements on Human Systems Technology, Medical, and CBD Technology. Oversight is provided by the Joint Directors of Laboratories, Training and Personnel Systems Science and Technology Evaluation Management and Armed Services Biomedical Research Evaluation and Management.

D. (U) SCHEDULE PROFILE: Not applicable.

R-1 Line Item 9

Budget Item Justification
(Exhibit R-2, page 21 of 22)

UNCLASSIFIED

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 2

PROGRAM ELEMENT: 0602233N

PROGRAM ELEMENT TITLE: Human Systems Technology

THIS PAGE IS INTENTIONALLY LEFT BLANK

R-1 Line Item 9

Budget Item Justification
(Exhibit R-2, page 22 of 22)

UNCLASSIFIED