ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2 Exhibit)

June 2001

BUDGET ACTIVITY	PE NUMBER AND TITLE
2 - APPLIED RESEARCH	**0602716A - Human Factors Engineering Technology**

COST (In Thousands)	FY 2000 Actual	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
Total Program Element (PE) Cost	19428	18119	16466	0	0	0	0	0	0	0
H34 RURAL HEALTH TECH	3246	2478	0	0	0	0	0	0	0	0
H70 HUMAN FACT ENG SYS DEV	16182	15641	16466	0	0	0	0	0	0	0

A. Mission Description and Budget Item Justification:

PLEASE NOTE: This administration has not addressed FY2003-2007 requirements. All FY 2003-2007 budget estimates included in this book are notional only and subject to change.

The primary objectives of this program are to maximize the effectiveness of soldiers in concert with their materiel so that they may survive and prevail on the battlefield in the context of the Army Transformation to the Objective Force. Specialized laboratory studies and field evaluations are conducted to collect performance data on the capabilities and limitations of soldiers, with particular attention on soldier and equipment interaction. The Congressionally directed program on Rural Health Technology focuses on the researching, field testing, and empirical validation of methods for improving the coordinated functioning of civilian and military emergency medical teams. The cited work is consistent with the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan and Project Reliance. The program element contains no duplication with any effort within the Military Departments. Work is performed by the Army Research Laboratory.

B. Program Change Summary	FY 2000	FY 2001	FY 2002	FY 2003
Previous President's Budget (FY2001 PB)	19681	15786	16444	0
Appropriated Value	19792	18286	0	
Adjustments to Appropriated Value	0	0	0	
a. Congressional General Reductions	0	0	0	
b. SBIR / STTR	-254	0	0	
c. Omnibus or Other Above Threshold Reductions	-39	0	0	
d. Below Threshold Reprogramming	1	0	0	
e. Rescissions	-72	-167	0	
Adjustments to Budget Years Since FY2001 PB	0	0	22	
Current Budget Submit (FY 2002/2003 PB)	19428	18119	16466	0

Change Summary Explanation: Funding - FY 2001: A Congressional add was received for H34, Rural Health Technology (+2500), to expand Med Teams into a broader base of medical settings, including integration with advanced life support algorithms and advanced cardiac life support technology.

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit)

June 2001

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
2 - APPLIED RESEARCH	**0602716A - Human Factors Engineering Technology**	**H34**

COST (In Thousands)	FY 2000 Actual	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
H34 RURAL HEALTH TECH	3246	2478	0	0	0	0	0	0	0	0

A. Mission Description and Budget Item Justification: This is a congressionally funded program. The Medical Teams program provides for the researching, field testing, and empirical validation of methods for improving the coordinated functioning of emergency medical teams (both military and civilian). This project, initially supported by Congress in FY96, extends previous Army research on the effective training and evaluation of military aviation crews and systematically applies it to the collection of hospital and pre-hospital personnel who must perform as an effective team during the initial "golden hour" of shock/ trauma or acute patient care. Additionally, this project provides both the civilian and military medical communities with a rigorous framework for objectively assessing the "value- added" of selected telemedicine and medical decision management technologies.

FY 2000 Accomplishments

- 3245 - Completed validation study of MedTeams in emergency departments, showing an 80% reduction in clinically significant errors.
  - Continued moving the MedTeams system into military field environments with a real-world demonstration and validation testbed using active assets of the 44th Medical Brigade including the 28th and 86th Combat Support Hospitals.
  - Began extending MedTeams implementation beyond emergency departments, with Labor and Delivery selected for the next specialty area.
  - Completed investigation of MedTeams cost-effective sustainment methods in the emergency department.

Total 3245

FY 2001 Planned Program

- 2500 - Begin cross validation of MedTeams into Labor and Delivery departments by completing the needs assessment and beginning full-scale development of a test system.
  - Continue refinement of basic and sustainment methods for MedTeams, exploring the use of moderate cost next generation simulators to enhance learning and retention

FY 2001 Planned Program (Continued)

- Formulate mechanisms to integrate MedTeams into a broader base of medical settings, including integration with Advanced Life Support algorithms and Advanced Cardiac Life Support (ACLS) training.
- Extend validated cost effective methods for MedTeams sustainment to Combat Support Hospitals.

Total 2500

FY 2002 Planned Program

- Project not funded in FY 2002.

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit)

June 2001

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
2 - APPLIED RESEARCH	**0602716A - Human Factors Engineering Technology**	**H70**

COST (In Thousands)		FY 2000 Actual	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
H70	HUMAN FACT ENG SYS DEV	16182	15641	16466	0	0	0	0	0	0	0

A. Mission Description and Budget Item Justification: The goal of this program is to maximize the effectiveness of soldiers in concert with their equipment, in order to survive and prevail on the battlefield in the context of the Army Transformation to the Objective Force. The barriers to achieving the goal include incomplete soldier performance data and models of the new missions, organizations, and new and complex technologies transforming the Army. Specialized laboratory studies and field evaluations are conducted to collect performance data on the capabilities and limitations of soldiers, with particular attention on soldier and equipment interaction. The resulting data are the basis for weapon systems and equipment design standards, guidelines, handbooks and soldier training and manpower requirements to improve equipment operation and maintenance. Application of advancements yields reduced workload, fewer errors, enhanced soldier protection, user acceptance, and allows the soldier to extract the maximum performance from the equipment. This program supports the Objective Force transition path of the Transformation Campaign Plan (TCP).

FY 2000 Accomplishments

- 5026 - Completed the human factors analysis of XVIII Airborne Corps "Green Ramp" operations and generated task workload models to identify bottlenecks and streamline the ammunition logistics footprint for deploying units in support of the Defense Ammunition Logistics Agency.

  - Completed field study to identify key human performance factors affecting maintenance manpower utilization rates.

  - Evaluated new technique for predicting motion sickness in the Vetronics Technology Testbed (VTT). Completed report of results of indirect driving study, which provided TARDEC and Future Combat Systems (FCS) contractors the basis for display design in their concepts. Designed studies to compare results from indirect vision driving field tests with simulator environment to validate use of simulation rather than actual vehicles for future studies in support of FCS.

  -Defined baseline task and workload models to target crew size reduction opportunities for the Crewstation Integration and Automation Testbed (CAT) Advanced Technology Demonstration (ATD), which supports FCS.

  - Provided human factors guidelines on the design and use of 3-D audio and speech recognition interfaces to TARDEC for the Vetronics Technology Testbed and the Virtual Cockpit Optimization Program.

  - Conducted a field study to determine the effect of advanced display technologies, e.g. 3-D audio, speech recognition and active noise reduction on dismounted soldier task performance under different levels of stress and mental workload.

FY 2000 Accomplishments (Continued)

- Identified and categorized physiological and behavioral performance data and existing and emerging models for application to dismounted warrior modeling as part of the Warrior Systems Modeling Technology (WSMT) STO.
- Conducted an experiment to determine the effects of Objective Individual Combat Weapon (OICW) recoil levels on soldier shooting performance.

• 3299
- Provided predictive models of command and Control (C2) soldier performance under varying levels of stress, diverse staffing concepts, and advanced digitization technologies to TRADOC Program Integration Office (TPIO), Army Battle Command System (ABCS), TRADOC System Manager (TSM) and TSM TOC. (Cognitive Engineering STO)
- Performed soldier focused assessments of various battlefield reasoning and multi-modal display systems to support commander and staff decision-making processes for BCBL-H.
- Conducted human factors evaluation of ABCS functionality and maintenance of situation awareness in the battle command of light forces during the Joint Contingency Force (JCF) Advance Warfighting Experiment (AWE).
- Completed development of a rule-based computer model of the intelligence production system, which simulates how the quality of information in military intelligence databases and the soldier's ability to use that information meets commander and staff military intelligence requirements.

• 5657
- Showed the feasibility of linking soldier operator models to separate system and environment models through standard computer communications (i.e., "high level architecture") for the purpose of system design evaluation.
- Provided human factors engineering design guidance to STRICOM for development of a next-generation human locomotion interface for a dismounted soldier simulator. (Virtual Environment for Dismounted Soldier STO)
- Provided Human Factors Engineering (HFE) and MANPRINT support to AMC, AMC RDECs, TRADOC Centers, Schools and Battle Laboratories, ATEC and other service laboratories. (Includes FCS Support)

• 2200
- Transitioned cognitive engineering STO products addressing critical training, leader development and soldier support (TLS) research issues to CECOM, DARPA, and TRADOC battlelabs.
- Transitioned from the Advanced Displays and Interactive Displays Federated Laboratory, the course-of-action planning tool "FOX-GA" and accompanying applications to CECOM's "CADET" for Agile Commander ATD.

Total 16182

FY 2001 Planned Program

- 4964 Provide CASCOM with recommendations on reducing manpower and improving performance in deploying units by completing a HF study to identify high manpower maintenance tasks.

  - Identify critical soldier performance metrics and establish plan for evaluation of FCS contractor concepts focused on cognitive workload in a sensor-rich environment, crew role versus automation in mission conduct, crew life-cycle cost, crew capability to control multiple unmanned systems, and dismounted soldier information needs. (CAT ATD)

  - Analyze soldier performance data from the FY 00 Vetronics Technology Testbed (VTT) STO and provide analysis to TARDEC and FCS contractors.

  - Provide TACOM with baseline crew station designs, which support FCS in preparation for FY 04 CAT ATD demo.

  - Evaluate contribution of new technologies such as voice recognition and 3-D audio to aviator performance in a virtual cockpit compared to traditional visual and tactile displays and controls.

  - Provide design guidelines to SBCCOM-NSC, the Infantry School and Dismounted Battlespace Battle Lab on the effects of advanced audio display technologies on dismounted soldier tasks performance.

  - Validate the dismounted soldier baseline day for use in evaluating soldier equipment interface and compatibility and transition to SBCCOM-NSC and the Infantry School. (WSMT STO)

  - Conduct study to determine the effect of weapon support and weight on soldier aiming accuracy for application to the Light Fighter Lethality program.

- 3771 - Specify optimum configuration of staff and digitization capabilities by expanding models of C2 soldier performance during contingency, joint, strategic operations to TPIO-ABCS, DARPA Command Post of the Future (CPOF), and Joint and Army Vision 2010 doctrinal elements. (Cognitive Engineering STO)

  - Conduct follow-on human factors evaluation of ABCS functionality in the division command post exercise (DCX) to improve system integration in the first digital division.

  -Validate the intelligence production model (IPM) in intelligence field units at varying command levels.

- 5520 - Conduct experiment on the utility of complex cognitive models embedded within soldier-system level models for practical system design evaluation.

FY 2001 Planned Program (Continued)

- Conduct an investigation of the integrated system behavior between the mobility interface device and the control systems for the dismounted soldier combatant simulation. Transition results to STRICOM and the Army Research Institute (ARI). (Virtual Environment for the Dismounted Soldier STO)

- Provide HFE and MANPRINT support to AMC, AMC RDECs, TRADOC Centers, Schools and Battle Laboratories, ATEC and other service laboratories.

• 1237 - Leverage Initial Brigade planning and experimentation to address cognitive engineering of battle command operations.

- Transition final architecture, software and media of visualizations for multi-modal sensory computer control algorithms to the Agile Commander ATD.

• 149 - Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs.

Total 15641

FY 2002 Planned Program

• 4252 - Complete human factors concept evaluations with CASCOM and transition Roller Platform for Air Delivery and Palletized Loading System Shoe to TACOM.

- Conduct field concept evaluations of new intermodal handling concepts at ammunition supply chain nodes for Defense Ammunition Logistics Agency (DALA) and Combined Arms Support Command (CASCOM) to create most effective and efficient ammunition deployment and sustainment operations.

- Design more accurate tool to predict maintenance manpower, personnel, and training requirements for future weapons systems based on validated measures from FY00-01 field studies and data analysis.

- Conduct soldier performance evaluations of the four FCS contractor concepts, identify promising concepts and potential problem areas, and provide results with the FCS Technical and Operational IPTs. Define additional research needed to meet objective force requirements for incorporation into CAT STO demo in FY 04.

- Conduct experiments and field studies, using validated dismounted soldier metrics, to fill identified data voids and transition the results to the SBCCOM-NSC WSMT STO.

- Prototype a comprehensive warfighter performance model using previously collected behavioral performance data and leverage NATO and USMA related work.

FY 2002 Planned Program (Continued)

- Assess the effects of various target cueing and acquisition methods (audio, graphical, etc.) on soldier shooting performance and transition to the Light Fighter Lethality program.

• 3834 - Refine models and tools for adaptive performance and document implications for their use in the development of training and support systems. (Cognitive Engineering STO)

- Provide definitive guidelines for using C2 soldier performance predictive models in conjunction with C2 measures used in live exercises to guide experimentation planning and analysis for primary ABCS related Battle Labs (BCBL, MMBL, DSABL).

- Refine a framework for assessing the human factors aspects of digitization to support Army force modernization efforts.

- Apply IPM to assess Intelligence Analyst of the Future initiatives.

• 6880 - Provide cognitive processing models that better represent the details of soldier performance than simple task performance modeling alone, that are suitable for both stand-alone and linked modeling frameworks, and that include advanced performance shaping functions such as individual soldier characteristics and environmental stressors, all for the purpose of higher fidelity system design evaluation.

- Provide HFE and MANPRINT support to AMC, AMC RDECs, TRADOC Centers, Schools and Battle Laboratories, ATEC and other service laboratories.

• 1500 - Complete the transition of Cognitive Engineering of the Digital battlefield (STO) products to CECOM, DARPA, and TRADOC battlelabs.

- Complete the installation, instruction, and documentation of FEDLAB products to DARPA and CECOM Agile Commander ATD.

Total 16466