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

February 2002

BUDGET ACTIVITY	PE NUMBER AND TITLE
2 - Applied Research	**0602716A - HUMAN FACTORS ENGINEERING TECHNOLOGY**

COST (In Thousands)		FY 2001 Actual	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate
	Total Program Element (PE) Cost	17911	19791	17415	17132	17607	18309	19016
H34	RURAL HEALTH TECH	2404	2481	0	0	0	0	0
H70	HUMAN FACT ENG SYS DEV	15507	17310	17415	17132	17607	18309	19016

A. Mission Description and Budget Item Justification: 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. Rural Health Technology was transitioned to the Armed Forces Institute of Pathology in 4Q FY01. 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. This program supports the Objective Force transition path of the Transformation Campaign Plan (TCP).

B. Program Change Summary	FY 2001	FY 2002	FY 2003
Previous President's Budget (FY2002 PB)	18119	16466	16501
Appropriated Value	18286	19966	0
Adjustments to Appropriated Value	0	0	0
a. Congressional General Reductions	0	-175	0
b. SBIR / STTR	-222	0	0
c. Omnibus or Other Above Threshold Reductions	0	0	0
d. Below Threshold Reprogramming	15	0	0
e. Rescissions	-168	0	0
Adjustments to Budget Years Since FY2002 PB	0	0	914
Current Budget Submit (FY 2003 PB)	17911	19791	17415

Change Summary Explanation:

FY02 - Congressional adds were made for MedTeams, Project H34 ($2500)and Soldier Centered Design Tools For the Army Project H70 ($1000).

Projects with no R2-A:

Project H34:
- FY02 funding = $2500 MedTeams : The objective of this one year Congressional add was to expand Med Teams into a broader base of medical settings, including integration with advanced life support algorithms and advanced cardiac life support technology. No additional funding is required to complete this project.

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2 - Applied Research	**0602716A - HUMAN FACTORS ENGINEERING TECHNOLOGY**	**H70**

COST (In Thousands)		FY 2001 Actual	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate
H70	HUMAN FACT ENG SYS DEV	15507	17310	17415	17132	17607	18309	19016

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. 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 Materiel Command. This program supports the Objective Force transition path of the Transformation Campaign Plan (TCP).

FY 2001 Accomplishments:

- 4499 - In cooperation with CASCOM, analyzed human factors (HF) study results, identified areas for improvement, and formulated research plan for additional research.

  - Identified nine major MANPRINT challenges for Future Combat Systems and worked with FCS contractors to define their plans for resolution of the challenges. Worked with TARDEC to identify soldier-performance issues for CAT ATD in June 01 demo of visual system; in process of analyzing results.

  - Completed data analysis and reports from baseline study of indirect driving for VTT STO; provided initial drafts to TARDEC.

  - Completed evaluations of tasks by crew position to establish baseline crew design and provided recommended distribution of tasks for CAT ATD.

  - Provided support to PM Aircrew Integrated Systems (PM ACIS) in identifying appropriate auditory systems for use in virtual and real cockpit studies in FY 02.

  - Provided 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.

FY 2001 Accomplishments: (Continued)

- Conducted pilot studies to ensure that the soldier day paradigm was appropriate for evaluating soldier equipment interface and compatibility.

- Transitioned validated paradigm to SBCCOM-NSC and Infantry School for standardization of methods.

- Light Fighter Lethality program was canceled. Conducted a study to define the trade-offs of the Objective Individual Combat Weapon (OICW) weight versus Soldier Performance in support of OICW acquisition decisions.

• 3053 - Identified optimum configuration of staff and digitization capabilities during contingency, joint, strategic operations to TPIO-ABCS, and Joint and Army Vision 2010 doctrinal elements. (Cognitive Engineering STO)

- Conducted follow-on human factors evaluation of ABCS functionality in the division command post exercise (DCX) to improve system integration in the first digital division. Provided Human Factors inputs to the TRAC report.

- Validate the intelligence production model (IPM) in intelligence field units at varying command levels. Delayed until FY02.

• 6718 - Experimentally showed the application of cognitive modeling to military domain by evaluating situation awareness of individual soldier battlespace as a function of helmet-mounted information display.

- Conducted 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)

- Provided 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.

- Transitioned final visualizations for multi-modal sensory computer control algorithms to the Agile Commander ATD.

Total 15507

FY 2002 Planned Program

- 5729 - 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.

  - Assist PM Objective Force define, monitor, and assess the contractors' MANPRINT programs for phase 2. Provide co-lead for Soldier-Systems Integration Product Team. Define additional research needed to meet objective force requirements for incorporation into CAT STO demo in FY 04.

  - Conduct preliminary studies investigating operations-on-the-move impact on soldier performance using the TARDEC ride motion simulator.

  - 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 Dismounted Warrior Critical Task List using previously collected behavioral performance data and leverage NATO and USMA related work.

  - Conduct studies addressing audio and visual information presentation loads and their effects on soldier shooting performance.

- 2846 - 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.

- 6159 - 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.

FY 2002 Planned Program (Continued)

- Conduct studies to determine adverse effects of the use of night vision devices on human ability to use unaided night vision for similar military missions.

- Collect and compare pre-attentive and computationally descriptive models of human vision; collect militarily relevant target images; apply vision models to target images, evaluate strengths and weaknesses of each model.

- Include indoor firing (firing from enclosures) analysis into the auditory hazard model to predict safe use of weapons in urban environments.

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

• 1576 - 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.

• 1000 This one year Congressional add is for Soldier Centered Design Tools that will allow Soldier specific design constraints to be evaluated in the design process. No additional funding is required to complete this project.

Total 17310

FY 2003 Planned Program

• 6779 - Integrate existing ammunition logistics task workload models to create factory-to-foxhole model of ammunition logistics, capable of analyzing and optimizing soldier requirements at all nodal operations and transition to Defense Ammunition Logistics Agency.

- Research a prototype tool to predict maintenance manpower, personnel, and training requirements for future systems, which accounts for soldier attributes and enabling technology solutions for improved diagnostics and prognostics.

- Provide soldier performance criteria and data collection strategies to CAT ATD for use in the FY 04 demonstrations.

- Conduct evaluations of controlling a remote moving vehicle from another moving vehicle; examine command and control issues while on the move.

- Conduct Verification and Validation of the Dismounted Warrior Critical Task List, develop modeling and simulation performance inputs and transition to SBCCOM-NSC (WSMT STO).

- Assess the effects of known physiological and cognitive stressors on shooter accuracy and target engagement times and transition to SBCCOM-NSC and TACOM-ARDEC.

FY 2003 Planned Program (Continued)

•	3806	- Validate models and tools for adaptive performance and apply to prototype Objective Force organizations.
		- Identify and quantify soldier visualization principles for COA predictions, adapting to novel situations, risk management and automated battlefield issues for Objective Force full spectrum Army missions and transition to TPIO-ABCS.
		- Verify and validate framework for assessing the human factors aspects of digitization to support Army force modernization efforts.
		- Investigate the extension and application of IPM to error prone decision-making tasks in other battlefield functional areas.
•	6030	- Provide user-accessible cognitive modeling capability to combat and material developers so that the full range of soldier cognitive and task performance can be considered in a cost-effective manner in all phases of acquisition.
		- Conduct experiment to examine target and obstacle detection, depth and distance estimation, and size and depth perception with color night vision goggles. (Delayed from FY01 due to equipment development)
		- Validate vision model performance and integrate strengths of each model into the ARL-HRED computational vision model.
		- Develop and utilize an improved auditory test manikin to determine effects of non-linear protection on human hearing.
		- Provide HFE and MANPRINT support to AMC, AMC RDECs, ATEC and other service laboratories.
•	800	- Funds Reprogrammed for ARL lab management support.

Total 17415