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

February 2003

BUDGET ACTIVITY	PE NUMBER AND TITLE
3 - Advanced technology development	**0603015A - Next Generation Training & Simulation Systems**

	COST (In Thousands)	FY 2002 Actual	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
	Total Program Element (PE) Cost	0	0	18649	20379	23099	23436	23618	23653
S28	INSTITUTE FOR CREATIVE TECHNOLOGY (ICT)-ATD	0	0	491	1668	5294	5291	5299	5296
S29	MODELING & SIMULATION - ATD	0	0	4396	4971	4079	4429	4581	4627
S30	JOINT VIRTUAL BATTLESPACE	0	0	6881	6870	6863	6858	6869	6865
S31	RDEC FEDERATION	0	0	6881	6870	6863	6858	6869	6865

A. Mission Description and Budget Item Justification: This program element demonstrates advanced technology for the next generation training and simulation systems of the Objective Force (OF). Technology demonstration is focused in four major areas. First, the Immersive Training Demonstrations project incorporates advanced modeling and simulation (M&S) and training and leader development technology into training demonstrations that have an emphasis on urban operations. Second, the Modeling & Simulation project will demonstrate a framework for future embedded training and simulation systems for the Future Combat Systems (FCS), the dismounted soldier, and the OF. Third, the Joint Virtual Battlespace (JVB) project develops and demonstrates the overarching M&S architecture that facilitates force-on-force modeling, supports the play of systems models, provides access to measures of effectiveness, and contributes to and works within the total OF. Fourth, the Research Development and Engineering Command (RDEC) Federation project will provide operational instances of interoperable component engineering-level simulations and models that conform to the JVB architecture specification to support and augment testing and training of the OF. Work is performed by the Provisional Research Development and Engineering Command (RDE Command), and by the Joint Precision Strike Demonstration (JPSD) project office of the Program Executive Office for Intelligence, Electronic Warfare & Surveillance (PEO IEW&S). 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 in this program element is related to and fully coordinated with efforts in PE 0603238A, Project 177 (JT ALS PS DEMO); PE 0602308A, Project C90 (Advanced Distributed Simulation); PE 0602308A, Project D02 (Modeling and Simulation for Training and Design); PE0603001A, Project 545 (Force Projection Logistics); and PE0601104A, Project J08 (Institute for Creative Technology). This is a new PE established to transition maturing technology from PE0601104A, Project J08 (Institute for Creative Technology); PE 0602308A, Project C90 (Advanced Distributed Simulation); and PE 0602308A, Project D02 (Modeling and Simulation for Training and Design) into demonstration efforts. This program supports the Objective Force transition path of the Transformation Campaign Plan. No Defense Emergency Response Funds were provided to the program.

B. Program Change Summary	FY 2002	FY 2003	FY 2004	FY 2005
Previous President's Budget (FY 2003)	0	0	0	0
Current Budget (FY 2004/2005 PB)	0	0	18649	20379
Total Adjustments	0	0	18649	20379
Congressional program reductions				
Congressional rescissions				
Congressional increases				
Reprogrammings				
SBIR/STTR Transfer				
Adjustments to Budget Years			18649	20379

Significant Changes:

FY04 - Funds increased to support Next Generation Training & Simulation Systems through investments in Immersive Training Demonstrations; Modeling and Simulation; JVB and RDEC Federation efforts by moving funds from modeling and simulation related efforts that were previously funded in several different PEs.

FY05- Funds increased to support Next Generation Training & Simulation Systems through investments in Immersive Training Demonstrations; Modeling and Simulation; JVB and RDEC Federation efforts by moving funds from modeling and simulation related efforts that were previously funded in several different PEs.

Project S30 was previously funded in PE 0603238, Project 177 (JT ALS PS Demo) in FY 03. Funding was added to accelerate and expand JVB capabilities to support FCS and OF decision making.

Project S31 was previously funded in PE 0602308A, Project C90 (Advanced Distributed Simulation) and PE0603001A, Project 545 (Force Projection Logistics) in FY 03. Funding was added to accelerate and expand RDEC Federation capabilities to support FCS and OF decision making.

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February 2003

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
3 - Advanced technology development	**0603015A - Next Generation Training & Simulation Systems**	**S28**

COST (In Thousands)		FY 2002 Actual	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
S28	INSTITUTE FOR CREATIVE TECHNOLOGY (ICT)-ATD	0	0	491	1668	5294	5291	5299	5296

A. Mission Description and Budget Item Justification: This project will mature and demonstrate affordable immersive technologies that include the application of photo-realistic synthetic environments, multi-sensory interfaces, virtual humans, and training applications on low-cost game platforms. Immersive technologies will enrich the Army's capabilities and readiness by expanding the types of experiences that can be trained or rehearsed, and by improving the effectiveness of the experience and the quality of the result. The synergy between these immersive technologies and the embedded training advanced technology development in Project S29 (Modeling and Simulation) of this PE will provide units with a set of complementary embedded and deploy on-demand systems that provide just-in-time, dynamic, realistic training and mission rehearsal capabilities. This project will use advanced modeling, simulation, and leadership development techniques to leverage the emerging immersive technologies that are being created at the Institute of Creative Technologies (ICT) University Affiliated Research Center (UARC) at the University of Southern California to develop training demonstrations that will have an emphasis on urban operations and asymmetric warfare. The ICT's collaboration with its entertainment partners and TRADOC will create a true synthesis of creativity and technology that harnesses the capabilities of industry and the R&D community to advance the Army's ability to train and practice military skills across the full spectrum of conflict. This project was set up to transition basic and applied research from PE0601104A, Project J08 (Institute for Creative Technology); and PE 0602308A, Project D02 (Modeling & Simulation for Training & Design). Work is performed by the Provisional RDE Command. This project supports the Objective Force transition path of the Transformation Campaign Plan. No Defense Emergency Response Funds were provided to the project.

Accomplishments/Planned Program	FY 2002	FY 2003	FY 2004	FY 2005
In FY 04, integrate immersive evaluation techniques into a training and leader development advanced technology demonstration within the OneSAF program. Demonstrations will incorporate a train-alone capability by incorporating advanced artificial intelligence techniques for after action review. In FY 05, use immersive environments developed for training and simulation systems to facilitate the integration of new algorithms and techniques into the after action review processes to permit self-assessment of mission accomplishment. Demonstrations will include a prototypical highly immersive multi-sensory environment that provides mixed reality (real and synthetic) objects for training and mission rehearsal.	0	0	491	1668
Totals	0	0	491	1668

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February 2003

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
3 - Advanced technology development	**0603015A - Next Generation Training & Simulation Systems**	**S29**

COST (In Thousands)		FY 2002 Actual	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
S29	MODELING & SIMULATION - ATD	0	0	4396	4971	4079	4429	4581	4627

A. Mission Description and Budget Item Justification: This project will mature and demonstrate affordable next generation training and simulation systems that focus on virtual threats, asymmetric warfare, network-centric operations, and embedding training capabilities and technologies into operational go-to-war FCS and Objective Force Warrior (OFW) systems. This project will use simulation techniques and tools that include computer generated forces, virtual terrain databases, and small image generators to create virtual training environments that include virtual opposing forces that can be detected and engaged by operators of go-to-war systems. Embedding simulation based training technologies into combat vehicles and dismounted soldier systems will enrich the Army's training capabilities and readiness. It will provide soldiers, crews, and small unit leaders whose operational systems are located at homestation or deployed to remote locations worldwide with the ability to use those systems as training and mission rehearsal tools. These next generation training systems will contain embedded wireless technologies that connect mounted and dismounted soldiers and other weapon systems to support distributed combined arms team training. The synergy between these embedded training capabilities and the immersive training advanced technology development in Project S28 (Immersive Training Demonstrations) of this PE will provide Army units with a set of complementary embedded and deploy on-demand systems that provide just-in-time, dynamic, realistic training and mission rehearsal capabilities. Demonstrations will include technologies that form a framework for future training applications for the range of FCS operations such as robotic control and other sensor operation; mission planning and rehearsal; command, control, and maneuver; C4ISR network analysis to support distributed simulations; and vehicle system interface requirements. This project was set up to transition basic and applied research from PE 0602308A, Project C90 (Advanced Distributed Simulation). Work is performed by the Provisional RDE Command. This project supports the Objective Force transition path of the Transformation Campaign Plan. No Defense Emergency Response Funds were provided to the project.

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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
3 - Advanced technology development	**0603015A - Next Generation Training & Simulation Systems**	**S29**

Accomplishments/Planned Program	FY 2002	FY 2003	FY 2004	FY 2005
In FY 04, integrate training hardware/software prototype with TARDEC's VETRONICS Technology Integration vehicle to provide a test of the system in a realistic environment and identify issue related to impact to tactical operation systems. Conduct a Mission Rehearsal experiment on a live surrogate vehicle using embedded simulation. Conduct a collective exercise with live and virtual training systems demonstrating robotics asset control training using appropriate resolution models that provide increased mission effectiveness of the embedded Combined Arms Team Trainers for FCS. Develop and experiment with simulations of C4ISR networks that will accommodate both operational and training network traffic to permitting deployed Combined Arms Team Training using embedded simulation environments. Initiate integration of mounted and dismounted soldier embedded training systems to address how individual soldiers, vehicle crews and small units will train, rehearse, and fight together. In FY 05, conduct experiments with mounted and dismounted embedded simulation systems to demonstrate the connectivity between the FCS and the OFW system. Demonstrate an embedded intelligent tutoring capability to provide training assessment and feedback to individual crew members based on training task, conditions, and standards for embedded training systems. Demonstrate prototype embedded instrumentation system addressing requirements for diagnostics, prognostics, testing and training maximizing the commonality of the individual system requirements.	0	0	4396	4971
Totals	0	0	4396	4971

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February 2003

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
3 - Advanced technology development	**0603015A - Next Generation Training & Simulation Systems**	**S30**

COST (In Thousands)		FY 2002 Actual	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
S30	JOINT VIRTUAL BATTLESPACE	0	0	6881	6870	6863	6858	6869	6865

A. Mission Description and Budget Item Justification: In combination, Projects S30 (Joint Virtual Battlespace) and S31 (RDEC Federation) will provide the documented foundation for an integrated modeling and simulation architecture and reference implementation. This will allow each organization to be responsible for providing the data, models, and simulations that represent its functionality. This project provides the simulation architecture component of a robust, analytical and experimental M&S capability to study the key characteristics of network-centric warfighting systems and enable the evaluation of FCS, OF, and Joint Forces concepts. The architectural concept will include standardized component interfaces that separate warfighting platforms from battlefield issues such as command and control structures, environment (weather, terrain), and battlefield emissions (propagation, sensing). The architecture developed in this Project will integrate the "best of breed" engineering-level component models from the Army's Provisional RDE Command that are developed in Project S31 (RDEC Federation) of this PE. The resulting M&S capability that combines this Project's architectural component with the component models in Project S31 will provide the user with a tailorable, scalable system that addresses both human and hardware in the loop force-on-force scenarios. The resulting M&S capability will also serve as an integral part of a future persistent Army Collaborative Environment under the auspices of the Simulation and Modeling for Acquisition, Requirements and Training (SMART) initiative. In FY 03 this effort was funded in PE 0603238, Project 177 (JT ALS PS Demo). Work is performed by the JPSD project office of the PEO IEW&S. This project supports the Objective Force transition path of the Transformation Campaign Plan. No Defense Emergency Response Funds were provided to the project.

Accomplishments/Planned Program	FY 2002	FY 2003	FY 2004	FY 2005
In FY 04, enhance the JVB Architecture through the integration of lethality, survivability, and environment servers and the enhancement of the sensors and human factors models. Update and enhance the command, control, and communications grid of the JVB architecture. Develop enhanced tools for component technology and system of systems design trade-offs. Integrate commercial prototypes and conduct operational analysis of contractor provided concepts in support of OF trade offs. Document the newly developed and enhanced run time interfaces, federated object models and application program interfaces. In FY 05, integrate fusion, damage, and sustainment servers. Update the lethality, survivability, and environment servers. Conduct Joint experiment for tactics, techniques, and procedures and concept of operations for the equivalent of a dismounted infantry company. Build, publish, and distribute government owned version 1.0 software of the JVB architecture. Document the newly developed and enhanced run time interfaces, federated object models, and application program interfaces.	0	0	6881	6870
Totals	0	0	6881	6870

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February 2003

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
3 - Advanced technology development	**0603015A - Next Generation Training & Simulation Systems**	**S31**

COST (In Thousands)		FY 2002 Actual	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
S31	RDEC FEDERATION	0	0	6881	6870	6863	6858	6869	6865

A. Mission Description and Budget Item Justification: In combination, Projects S30 (Joint Virtual Battlespace) and S31 (RDEC Federation) will provide the documented foundation for an integrated modeling and simulation architecture and reference implementation. This will allow each organization to be responsible for providing the data, models, and simulations that represent its functionality. This project provides engineering-level simulation model components of a robust, analytical and experimental M&S capability to study the key characteristics of network-centric warfighting systems and enable the evaluation of FCS, OF, and Joint Forces concepts. The architectural concept will include standardized component interfaces that separate warfighting platforms from battlefield issues such as command and control structures, environment (weather, terrain), and battlefield emissions (propagation, sensing). This project will provide the "best of breed" engineering-level component models from the Army's Provisional RDE Command that will be integrated into the simulation architecture developed in Project S30 (Joint Virtual Battlespace) of this PE. The resulting M&S capability that combines this Project's component simulation models with the architecture developed in Project S30 will provide the user with a tailorable, scalable system that addresses both human and hardware in the loop force-on-force scenarios. The resulting M&S capability will also serve as an integral part of a future persistent Army Collaborative Environment under the auspices of the Simulation and Modeling for Acquisition, Requirements and Training (SMART) initiative. In FY 03 this effort was funded in PE 0602308A, Project C90 (Advanced Distributed Simulation) and PE0603001A, Project 545 (Force Projection Logistics). Work is performed by the Provisional RDE Command. This project supports the Objective Force transition path of the Transformation Campaign Plan. No Defense Emergency Response Funds were provided to the project.

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Accomplishments/Planned Program	FY 2002	FY 2003	FY 2004	FY 2005
In FY 04, Release Reference Implementation v0.5 that will comply with JVB architectural standards. Develop and modify computer software and procure the hardware necessary to connect each site in a secure distributed network. Conduct series of experiments exploring component fidelity. Further develop network sensitivity, scalability, and update environment. Continue development of methodologies to incorporate asymmetric warfare. Enhance human performance modeling to include command control information operations and individual/crew models. Include additional component M&S to include logistics resupply, ATEC, TRADOC, and other Services. In FY 05, further develop server fidelity, network infrastructure, and agent based technology. Validate the RDEC Federation environment and update as needed. Improve human performance modeling and continue component integration. Improve network sensitivity and scalability to implement Reference Implementation v1.0.	0	0	6881	6870
Totals	0	0	6881	6870