Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Army											DATE: April 2013	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*					R-1 ITEM NOMENCLATURE PE 0603015A: *Next Generation Training & Simulation Systems*							
COST ($ in Millions)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	14.970	17.257	13.627	-	13.627	13.316	13.853	16.552	16.637	Continuing	Continuing
S28: *Immersive Learning Environments*	-	3.053	2.799	2.572	-	2.572	2.704	3.144	3.278	3.124	Continuing	Continuing
S29: *Modeling & Simulation - Adv Tech Dev*	-	5.091	4.367	6.444	-	6.444	5.486	5.580	5.674	5.776	Continuing	Continuing
S31: *Modeling And Simulation Infrastructure Technology*	-	6.826	10.091	4.611	-	4.611	5.126	5.129	7.600	7.737	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

Note

FY14 funding realigned to higher priority efforts.

A. Mission Description and Budget Item Justification

This program element (PE) matures and demonstrates tools to enable effective training capability for the Warfighter. Project S28 matures and demonstrates simulation technologies developed by the Institute for Creative Technology. Project S29 incorporates advanced modeling and simulation (M&S), training, and leader development technology into immersive training demonstrations as well as demonstrates a framework for future embedded training and simulation systems for future force combat and tactical vehicles, and dismounted Soldier systems. Project S31 develops, integrates and demonstrates an overarching M&S architecture that incorporates multi-resolution entity-based models, simulations, and tools to enable Network-Centric Warfare M&S capability.

Work in this PE complements and is fully coordinated with efforts in PE 0602308A (Advanced Concepts and Simulation), PE 0602785 (Manpower/Personnel/Training Technology), PE 0602787A (Medical Technology) and PE 0603007A (Manpower, Personnel and Training Advanced Technology).

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy

Work in this PE is performed by the Army Research Laboratory, Human Research and Engineering Directorate, Simulation and Training Technology Center (STTC), Orlando, FL.

Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Army					DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*			R-1 ITEM NOMENCLATURE PE 0603015A: *Next Generation Training & Simulation Systems*		
B. Program Change Summary ($ in Millions)	**FY 2012**	**FY 2013**	**FY 2014 Base**	**FY 2014 OCO**	**FY 2014 Total**
Previous President's Budget	17.907	17.257	19.462	-	19.462
Current President's Budget	14.970	17.257	13.627	-	13.627
Total Adjustments	-2.937	0.000	-5.835	-	-5.835
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-2.389	-			
• SBIR/STTR Transfer	-0.548	-			
• Adjustments to Budget Years	-	-	-5.835	-	-5.835

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603015A: *Next Generation Training & Simulation Systems*	PROJECT S28: *Immersive Learning Environments*	

COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
S28: *Immersive Learning Environments*	-	3.053	2.799	2.572	-	2.572	2.704	3.144	3.278	3.124	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

A. Mission Description and Budget Item Justification

This project matures and demonstrates immersive technologies that include the application of photorealistic synthetic environments, multi-sensory interfaces, virtual humans, and training applications on low-cost game platforms for Soldier training applications using simulation technologies. This project uses advanced modeling, simulation, and leadership development techniques to leverage the emerging immersive technologies that are created at the Institute of Creative Technologies (ICT) University Affiliated Research Center (UARC) at the University of Southern California to develop training prototypes for technology demonstrations with an emphasis on urban operations, asymmetric warfare, resilience and rehabilitation to support Warfighting units and Army Institutions (TRADOC and Medical). Resilience and rehabilitation research will focus on Post Traumatic Stress Disorder (PTSD). The ICT's collaboration with its entertainment partners creates a true synthesis of creativity and technology that harnesses the capabilities of industry, and the research and development community to advance the Army's capabilities.

Efforts in this program element support the Army science and technology Soldier portfolio.

Work in this PE complements and is fully coordinated with efforts in PE 0602308A (Advanced Concepts and Simulation), PE 0602785 (Manpower/Personnel/Training Technology), PE 0602787A (Medical Technology) and PE 0603007A (Manpower, Personnel and Training Advanced Technology).

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Army Research Laboratory (ARL), Human Research and Engineering Directorate, Simulation and Training Technology Center (STTC), Orlando, Florida.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Immersive Techniques for Training Applications	3.053	2.799	2.572
Description: This effort demonstrates and matures technological advancements from PE 0602308A/Project D02 into complex state-of-the-art simulation environments in support of multi-student and team training applications. In FY13 to FY15, this effort will support Technology Enabled Capability Demonstration 7b, Individual Training for Tactical Tasks.			
FY 2012 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603015A: *Next Generation Training & Simulation Systems*	PROJECT S28: *Immersive Learning Environments*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Developed virtual mission rehearsal trainers encompassing complex team, interpersonal actions as well as conflicts and is supported by interactive learning technologies; completed study that examines the measurement and impact of the sense of presence on learning in virtual environments. ***FY 2013 Plans:*** Develop technologies to fully immerse Soldiers in environment without obstructions; assess the use of distributed mobile platforms for the delivery of training software and applications to training subjects and validate the effectiveness relative to fixed platforms. ***FY 2014 Plans:*** Will mature the tools and technologies required to create prototype simulations, games, and virtual environments focused on training commanders on the decision making, planning, and leadership for institutional and Warfighting units; will explore advanced display technologies to prototype new low cost immersive displays for virtual training environments.			
Accomplishments/Planned Programs Subtotals	3.053	2.799	2.572

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603015A: *Next Generation Training & Simulation Systems*	PROJECT S29: *Modeling & Simulation - Adv Tech Dev*	

COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
S29: *Modeling & Simulation - Adv Tech Dev*	-	5.091	4.367	6.444	-	6.444	5.486	5.580	5.674	5.776	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

A. Mission Description and Budget Item Justification

This project matures and demonstrates next generation training and simulation systems that integrate virtual threats, asymmetric warfare concepts, network-centric operations, and embedding training capabilities as well as technologies into operational go-to-war future force systems to include dismounted warrior systems. The synergy between these embedded training capabilities and the immersive training advanced technology development in PE 060315/project S28 provides Army units with a set of complementary embedded as well as deploy-on-demand systems that provide just-in-time, dynamic, realistic training, and mission rehearsal capabilities. Demonstrations include technologies that form a framework for future training applications for the range of future force operations such as robotic control and other sensor operations; mission planning and rehearsal; command, control, and maneuver; Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) network analysis to support distributed simulations; and vehicle system interface requirements. This project creates a joint environment by synchronizing virtual and constructive simulated forces with the next generation and current training systems from the Army, Navy, Air Force, and Marine forces.

Efforts in this program element support the Army science and technology Soldier portfolio.

Work in this PE complements and is fully coordinated with efforts in PE 0602308A (Advanced Concepts and Simulation), PE 0602785 (Manpower/Personnel/Training Technology), PE 0602787A (Medical Technology) and PE 0603007A (Manpower, Personnel and Training Advanced Technology).

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Army Research Laboratory (ARL), Human Research and Engineering Directorate, Simulation and Training Technology Center (STTC), Orlando, Florida.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Embedded Techniques	4.301	4.367	6.444
Description: This effort matures and demonstrates capabilities (most provided from PE 0602308A/project C90) built into or added onto operational systems, subsystems, or equipment, to enhance as well as maintain the skill proficiency of Soldiers, and maximizes component commonality among combat vehicles and Soldier computer systems. In FY14, this effort will support Technology Enabled Capability Demonstration, 3b Surprise/Tactical Intelligence-Actionable Intelligence.			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603015A: *Next Generation Training & Simulation Systems*	PROJECT S29: *Modeling & Simulation - Adv Tech Dev*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
FY 2012 Accomplishments: Continued advanced technology demonstrator maturity improvements from PE 0602308A/project C90 Live, Virtual, Constructive (LVC) technologies such as real-time physics-based rendering of asymmetric forces in urban environments and prepare future experiments for FY13. Continued to evaluate, demonstrate and quantify the immersive simulation treatment effects and the long term results of treatment, and transition results as well as lessons learned to Army/DoD medical community. ***FY 2013 Plans:*** Integrate component level sensors for tracking Soldier movement, and augmented reality for dismounted Soldier immersive training environments; and commence planning for technology experiments, demonstrations and evaluations in FY14 of enhanced embedded training environments. Complete analysis and begin development of individual components for dismounted Soldier and embedded training technology that is not yet represented. The technology includes predictive technologies, artificial intelligence behaviors for interactive characters in a mixed kinetic/non-kinetic environment and sensors for locomotion and gesturing. ***FY 2014 Plans:*** Will design embedded training components (e.g. predictive simulation) for current and future Command and Control systems for both mounted and dismounted. Will design components for advance sensor technology for locomotion and gesturing. Will advance and mature technology for developing Artificial Intelligence behaviors for interactive characters in a mixed kinetic/non-kinetic training scenarios within a militarily dismounted infantry squad virtual game environment. Will advance and conduct experiementation with haptic feedback technology to enhance immersion in virtual and augmented reality environment.			
Title: Blast Modeling and Simulation (M&S) ***Description:*** This effort advances M&S to improve the survivability of ground vehicle occupants and dismounted soldiers to blast threats. Current blast M&S is limited to replicating finite blast-soil loading conditions, vehicle structure responses to the blast load, and the resulting biofidelic based injuries to the Soldier. To significantly improve designs, engineering, and assessment of existing and future blast protection technologies, Blast M&S needs to be more dynamic and predictive and the models must be verified, validated and accredited (VV&A). ***FY 2012 Accomplishments:*** Verified and Validated (V&V) blast M&S loading conditions to account for model variability due to soil conditions (type/composition, moisture content, overburden, and soil bed preparation); quantified M&S sub-vehicle system models for deviations in vehicle structural materials models for metals, composites, and elastomers accounting for variations in strength and fracture material properties.	0.790	0.000	0.000
Accomplishments/Planned Programs Subtotals	5.091	4.367	6.444

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603015A: *Next Generation Training & Simulation Systems*	PROJECT S29: *Modeling & Simulation - Adv Tech Dev*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603015A: *Next Generation Training & Simulation Systems*	PROJECT S31: *Modeling And Simulation Infrastructure Technology*	

COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
S31: *Modeling And Simulation Infrastructure Technology*	-	6.826	10.091	4.611	-	4.611	5.126	5.129	7.600	7.737	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

Note

Not applicable for this item.

A. Mission Description and Budget Item Justification

Efforts in this project mature and demonstrate state-of-the-art and simulation systems. These efforts include a distributed Modeling and Simulation (M&S) environment that integrates a collection of multi-fidelity models and simulations and tools that map to an evolving architecture and M&S activities to support decisions throughout the acquisition life-cycle. This provides a unifying M&S architecture that synchronizes and integrates multi-resolution modeling applications such as Live, Virtual, and Constructive experimentation. This effort ultimately comprises a portfolio focused on researching cutting edge M&S methods to enable the Army and DoD to perform critical System of Systems (SoS) analysis, experimentation, technology tradeoffs, capability assessments, concept development, and training that saves time and resources while increasing the effectiveness of acquisition and training activities.

Funding increase in FY13 reflects the use of Advanced Distributed Simulation Environments to support development of enterprise architectures for holistic modeling and simulation of dismounted Soldier protection, lethality with cognitive and physical performance.

Efforts in this program element support the Army science and technology Soldier portfolio.

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Army Research Laboratory (ARL), Human Research and Engineering Directorate, Simulation and Training Technology Center (STTC), Orlando, Florida.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Advanced Distributed Simulation Environments (previously titled Modeling Architecture for Technology, Research and Experimentation, MATREX)	6.826	10.091	4.611
Description: Starting in FY14, this effort is renamed from Modeling Architecture for Technology, Research, and Experimentation (MATRIX) to Advanced Distributed Simulation Environments to more accurately reflect this effort's evolution of simulation			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603015A: *Next Generation Training & Simulation Systems*	PROJECT S31: *Modeling And Simulation Infrastructure Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
technologies. Matures and demonstrates modeling and simulation technologies and techniques that provide the means to design, integrate, and use of M&S in support of Training, and Army experimentation to assess and support system acquisition and military planning decision-making, System of Systems architecture, technology tradeoffs, etc. In FY13 to FY15, this effort will support Technology Enabled Capability Demonstration (TeCD) 7b, Individual Training for Tactical Tasks and TeCD 1a, Force Protection-Basing with training and mission rehearsal M&S. ***FY 2012 Accomplishments:*** Demonstrated simulation and systems engineering tools for distributed integration and M&S reuse focused on System of Systems; researched and demonstrated emerging simulation methods to enable short turn around, critical analyses for the Army and DoD to include models for Soldier protection and performance trade space; demonstrated executable architectures for analysis, event management, and simulation initialization, on the RDECOM Virtual Testbed; researched and identified hardware and software technology solutions for current and future M&S challenges, concentrating on distributed execution of M&S. ***FY 2013 Plans:*** Mature the executable System of Systems architecture concept for analysis, event management, and simulation initialization for use throughout the Army and DoD to save time and money across a wider scope of SoS. Exploit and refine next generation architecture(s) that demonstrate advances in computer science to support future training, experimentation, and acquisition decisions tools; demonstrate computer cloud technologies to increase the ability to better use and distribute M&S application services to users; investigate capabilities to demonstrate the use of data from a central authoritative source maintained by other DoD agencies to expanded distributed capabilities beyond Army data sources; and refine Soldier protection and performance M&S representations to identify tradeoff analysis tools and future virtual training applications for commanders to optimize protection with Soldier load and performance. ***FY 2014 Plans:*** Will refine and mature System of Systems architecture for integration and use in Army and DoD simulation and training programs; mature a generalized interface for the systems engineering architecture and M&S tools for transition to DoD programs with existing M&S systems engineering capabilities; mature and refine Distributed Soldier Representation to provide a demonstration of Soldiers as a Service simulation experimentation that illustrates relevant use of Soldier human factors data to training; identify hardware and software solutions for current and future M&S challenges that decrease dependence on third party solutions; formalize M&S in a cloud environment supporting M&S as a service tool that supports training and mission rehearsal simulations across geographically distributed areas; integrate multi-processor environments; provide a tool to rapidly configure and run training simulations by maturing and translating simulations from complex scenario definitions and databases; and, mature and refine M&S tools targeted towards PEO STRI simulation gaps.			
Accomplishments/Planned Programs Subtotals	6.826	10.091	4.611

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603015A: *Next Generation Training & Simulation Systems*	PROJECT S31: *Modeling And Simulation Infrastructure Technology*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.