Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army										DATE: February 2012	
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)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**Cost To Complete**	**Total Cost**
Total Program Element	14.788	17.907	17.257	-	17.257	19.462	19.734	20.070	20.409	Continuing	Continuing
S28: *Immersive Learning Environments*	2.946	3.149	2.799	-	2.799	3.391	3.483	3.543	3.603	Continuing	Continuing
S29: *MODELING & SIMULATION - Adv Tech Dev*	7.116	6.042	4.367	-	4.367	5.944	5.486	5.580	5.674	Continuing	Continuing
S31: *Modeling and Simulation Infrastructure Technology*	4.726	8.716	10.091	-	10.091	10.127	10.765	10.947	11.132	Continuing	Continuing

Note

FY 13 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 2013 Army					DATE: February 2012
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 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**
Previous President's Budget	15.334	17.936	20.120	-	20.120
Current President's Budget	14.788	17.907	17.257	-	17.257
Total Adjustments	-0.546	-0.029	-2.863	-	-2.863
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.457	-			
• Adjustments to Budget Years	-	-	-2.863	-	-2.863
• Other Adjustments 1	-0.089	-0.029	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
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)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
S28: *Immersive Learning Environments*	2.946	3.149	2.799	-	2.799	3.391	3.483	3.543	3.603	Continuing	Continuing

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 under PE0601104/Proj J08 to formulate training demonstrations with an emphasis on urban operations and asymmetric warfare. 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 ability to train and practice military skills across the full spectrum of conflict.

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), Weapons and Materials Research Directorate, Aberdeen Proving Ground, Maryland and Human Research and Engineering Directorate, Simulation and Training Technology Center (STTC), Orlando, Florida.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Immersive Techniques for Training Applications	2.946	3.149	2.799
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.			
FY 2011 Accomplishments: Matured and refined software tools that rapidly author automated tutoring systems for specific training applications; matured methods to implement training applications on portable and mobile devices.			
FY 2012 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Develop virtual mission rehearsal trainers encompassing complex team, interpersonal actions as well as conflicts and is supported by interactive learning technologies; complete study that examines the measurement and impact of the sense of presence on learning in virtual environments. ***FY 2013 Plans:*** Will 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.			
Accomplishments/Planned Programs Subtotals	2.946	3.149	2.799

C. Other Program Funding Summary ($ in Millions)

N/A

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 2013 Army			DATE: February 2012
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)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
S29: *MODELING & SIMULATION - Adv Tech Dev*	7.116	6.042	4.367	-	4.367	5.944	5.486	5.580	5.674	Continuing	Continuing

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), Weapons and Materials Research Directorate, Aberdeen Proving Ground, Maryland and Human Research and Engineering Directorate, Simulation and Training Technology Center (STTC), Orlando, Florida.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Embedded Techniques	5.670	5.252	4.367
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.			
FY 2011 Accomplishments:			

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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 2011	FY 2012	FY 2013
Demonstrated immersive training on portable and mobile devices such as mobile hand-held devices as well as militarized personal computers; assessed and demonstrated software authoring tools for real-time creation and delivery of automated tutoring systems to distributed multi-student teams. ***FY 2012 Plans:*** Continue 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. Will continue 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:*** Will integrate component level sensors for tracking Soldier movement, and augmented reality for dismounted Soldier immersive training environments. Will commence planning for technology experiments, demonstrations and evaluations in FY14 of enhanced embedded training environments.			
Title: Advanced simulation to treat Post Traumatic Stress Disorder (PTSD) ***Description:*** This effort matures and demonstrates advanced simulation technologies developed at the Institute for Creative Technology (ICT) to treat the effects of PTSD. ***FY 2011 Accomplishments:*** Evaluated, demonstrated and quantified the immersive simulation treatment effects and the long term results of the treatment.	1.446	-	-
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 Plans:*** Verify and Validate (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); quantify 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	-
Accomplishments/Planned Programs Subtotals	7.116	6.042	4.367

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
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C. Other Program Funding Summary ($ in Millions)

N/A

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 2013 Army			DATE: February 2012
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)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
S31: *Modeling and Simulation Infrastructure Technology*	4.726	8.716	10.091	-	10.091	10.127	10.765	10.947	11.132	Continuing	Continuing

Note

Not applicable for this item.

A. Mission Description and Budget Item Justification

This project researches, matures, and demonstrates a distributed Modeling and Simulation (M&S) environment referred to as the Modeling Architecture for Technology, Research, and Experimentation (MATREX). MATREX researches and develops a robust M&S environment wherein a collection of multi-fidelity models, simulations and tools can be integrated as well as mapped to an evolving architecture for conducting multi-scale (time and spatial resolution) M&S activities to provide M&S data and information to multiple users for decision-making. MATREX provides a unifying M&S architecture and supporting structure that synchronize and integrate multi-resolution (time and space) modeling applications such as Live, Virtual, and Constructive experimentation. It also exploits applications, operational studies of Network-Centric Operations concepts and technologies, or the modeling of Battle Command operations with elements of advanced communications, information flow, data fusion, decision-making, and information warfare. MATREX also works to address M&S issues of model scalability, network design, enterprise services, and third party software compatibility issues. MATREX ultimately comprises a portfolio of one or more year's efforts 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, testing, and training.

Funding increase in FY13 reflects the use of MATREX 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), Weapons and Materials Research Directorate, Aberdeen Proving Ground, Maryland and Human Research and Engineering Directorate, Simulation and Training Technology Center (STTC), Orlando, Florida.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: MATREX	4.726	8.716	10.091

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
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 2011	FY 2012	FY 2013
Description: Matures and demonstrates modeling and simulation technologies and techniques that support Army experimentation and test events to assess and support system acquisition and military planning decision-making through the use of multi-fidelity models, simulations and tools as well as analysis activities, such as System of Systems, technology tradeoffs, etc. ***FY 2011 Accomplishments:*** Demonstrated cross-command data collection and analysis tools for integrated acquisition support capability; matured integrated M&S representation of Battle Command (future force network planning, pre-operation checkout, and integration with tactical command and control devices); integrated M&S support architectures for cross-domain M&S environment interoperability; and fused multi-resolution capabilities for modeling weather, terrain, chemical-biological effects and human behavior/human decision-making, networked sensor fusion, and tactical network to meet future analysis needs. ***FY 2012 Plans:*** Demonstrate simulation and systems engineering tools for distributed integration and M&S reuse focused on System of Systems (SoS); research and demonstrate 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; demonstrate executable architectures for analysis, event management, and simulation initialization, on the RDECOM Virtual Testbed; research and identify hardware and software technology solutions for current and future M&S challenges, concentrating on distributed execution of M&S. ***FY 2013 Plans:*** Will mature the executable SoS 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. Will exploit and refine next generation architecture(s) that demonstrates advances in computer science to support future training, experimentation, and acquisition decisions tools and; demonstrate computer cloud technologies to increase the ability to better use and distribute M&S application services to users; will 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.			
Accomplishments/Planned Programs Subtotals	4.726	8.716	10.091

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
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*

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.