Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Army										DATE: February 2011	
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 2010**	**FY 2011**	**FY 2012 Base**	**FY 2012 OCO**	**FY 2012 Total**	**FY 2013**	**FY 2014**	**FY 2015**	**FY 2016**	**Cost To Complete**	**Total Cost**
Total Program Element	25.895	15.334	17.936	-	17.936	20.120	23.265	20.940	25.543	Continuing	Continuing
HB5: *IMMERSIVE ENVIRONMENTS DEMONSTRATIONS (CA)*	1.990	-	-	-	-	-	-	-	-	Continuing	Continuing
S28: *Immersive Learning Environments*	2.898	3.054	3.154	-	3.154	3.257	3.353	3.442	3.501	Continuing	Continuing
S29: *MODELING & SIMULATION - Adv Tech Dev*	5.651	7.380	6.052	-	6.052	6.380	9.397	6.861	11.224	Continuing	Continuing
S31: *Modeling and Simulation Infrastructure Technology*	10.103	4.900	8.730	-	8.730	10.483	10.515	10.637	10.818	Continuing	Continuing
S33: *TRAINING AND SIMULATION SYSTEMS INITIATIVES (CA)*	5.253	-	-	-	-	-	-	-	-	Continuing	Continuing

Note

FY12 funding increase to support Underbody Blast Armor and Training Modeling and Simulation.

A. Mission Description and Budget Item Justification

Efforts in this program element (PE) mature and demonstrate tools to enable effective training capability for the Warfighter. The PE matures and demonstrates simulation technologies developed by the Institute for Creative Technology (project S28); 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 S29); 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 (project S31).

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).

Immersive Environments Demonstrations (project HB5) and Training and Simulation Initiatives (project S33) fund congressional special interest items.

The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, and the Army Science and Technology Master Plan.

Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Army	DATE: February 2011
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*

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

B. Program Change Summary ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Previous President's Budget	25.362	15.334	13.317	-	13.317
Current President's Budget	25.895	15.334	17.936	-	17.936
Total Adjustments	0.533	-	4.619	-	4.619
• Congressional General Reductions		-			
• Congressional Directed Reductions		-			
• Congressional Rescissions	-	-			
• Congressional Adds		-			
• Congressional Directed Transfers		-			
• Reprogrammings	1.194	-			
• SBIR/STTR Transfer	-0.661	-			
• Adjustments to Budget Years	-	-	4.619	-	4.619

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army			DATE: February 2011
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COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
HB5: *IMMERSIVE ENVIRONMENTS DEMONSTRATIONS (CA)*	1.990	-	-	-	-	-	-	-	-	Continuing	Continuing

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Immersive Environments advanced technology development.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Title: Joint Fires and Effects Training System (JFETS) ***Description:*** This is a Congressional Interest Item. ***FY 2010 Accomplishments:*** Investigated technology options for immersive capabilities for institutional training and enhancements to the field.	1.990	-	-
Accomplishments/Planned Programs Subtotals	1.990	-	-

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 2012 Army			DATE: February 2011
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 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
S28: *Immersive Learning Environments*	2.898	3.054	3.154	-	3.154	3.257	3.353	3.442	3.501	Continuing	Continuing

A. Mission Description and Budget Item Justification

Efforts in this project mature and demonstrate immersive technologies that include the application of photorealistic synthetic environments, multi-sensory interfaces, virtual humans, and training applications on low-cost game platforms. 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 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.

The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy and the Army Science and Technology Master Plan.

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

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Title: Immersive Techniques	2.898	3.054	3.154
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.			
FY 2010 Accomplishments: Demonstrated and refined methods and technologies that expand immersive environments to support multi-student and team training; demonstrated and matured methods to support computer generated after-action reviews, virtual human-based mentoring, and computer-directed scenario adaptation based on multi-player distributed training techniques; and matured and assessed environment for leaders to practice decision making skills in complex, cultural environments.			
FY 2011 Plans: Mature and refine software tools that rapidly author automated tutoring systems for specific training applications; and mature methods to implement training applications on portable and mobile devices.			
FY 2012 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army		DATE: February 2011
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 2010	FY 2011	FY 2012
Will develop virtual mission rehearsal trainers encompassing complex team, interpersonal actions as well as conflicts and is supported by interactive learning technologies; will complete study that examines the measurement and impact of the sense of presence on learning in virtual environments.			
Accomplishments/Planned Programs Subtotals	2.898	3.054	3.154

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 2012 Army			DATE: February 2011
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 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
S29: *MODELING & SIMULATION - Adv Tech Dev*	5.651	7.380	6.052	-	6.052	6.380	9.397	6.861	11.224	Continuing	Continuing

A. Mission Description and Budget Item Justification

Efforts in this project mature and demonstrate next generation training and simulation systems that focus on integrating virtual threats, asymmetric warfare, 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 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.

The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, and the Army Science and Technology Master Plan.

Work in this project is performed by the Research, Development, and Engineering Command (RDECOM), 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 2010	FY 2011	FY 2012
Title: Embedded Techniques	5.651	5.880	3.762
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 2010 Accomplishments: Teamed with U.S. Army Communications-Electronics Research, Development and Engineering Center (CERDEC) to exploit employing modeling and simulation technologies (i.e., Force Battle Command, Real-time Adversarial Intelligence Decision aid) in embedded training for current and future Command and Control (C2) systems used to train for asymmetric urban warfare environments; exploited technology development of computer-generated behaviors to simulate terrorist/insurgency urban warfare for future embedding into C2 systems; continued technology maturity for dismounted Soldier embedded training prototypes to			

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army		DATE: February 2011
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 2010	FY 2011	FY 2012
support next generation Soldier systems in collaboration with U.S. Army Natick Soldier Research, Development and Engineering Center (NSRDEC) and CERDEC. ***FY 2011 Plans:*** Demonstrate immersive training on portable and mobile devices such as mobile hand-held devices as well as militarized personal computers; assess and demonstrate software authoring tools for real-time creation and delivery of automated tutoring systems to distributed multi-student teams. ***FY 2012 Plans:*** Will continue advance 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 will prepare future experiments for FY13.			
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 Plans:*** Will evaluate, demonstrate and quantify the immersive simulation treatment effects and the long term results of the treatment. ***FY 2012 Plans:*** 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.	-	1.500	1.500
Title: Underbody blast modeling and simulation (UBB M&S) ***Description:*** Advanced M&S to improve the survivability of ground vehicle occupants to underbody blast threats. Current UBB M&S is limited to replicating finite blast-soil loading conditions, vehicle structure responses to the blast load, and the resulting injury to the crew. To significantly improve designs, engineering, and assessment of existing and future blast protection technology, UBB M&S needs to be more dynamic, predictive, verified, validated and accredited (VV&A). ***FY 2012 Plans:*** Will verify and validate UBB M&S loading conditions to account for model variability due to soil conditions (type/composition, moisture content, overburden, soil bed preparation); will quantify UBB M&S sub-vehicle system models for deviations in vehicle	-	-	0.790

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army		DATE: February 2011
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
structural materials models for metals, composites, and elastomers accounting for variations in strength and fracture material properties.			
Accomplishments/Planned Programs Subtotals	5.651	7.380	6.052

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 2012 Army			DATE: February 2011
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 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
S31: *Modeling and Simulation Infrastructure Technology*	10.103	4.900	8.730	-	8.730	10.483	10.515	10.637	10.818	Continuing	Continuing

Note

Not applicable for this item.

A. Mission Description and Budget Item Justification

Efforts in this project research, mature, and demonstrate 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 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.

The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, and the Army Science and Technology Master Plan.

Work in this project is led by the Research, Development, and Engineering Command (RDECOM), Army Research and Engineering Laboratory, Human Research and Engineering Directorate, Simulation and Training Technology Center (STTC), Orlando, FL, and executed across the Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Title: MATREX	10.103	4.900	8.730
Description: This effort 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.			
FY 2010 Accomplishments: Matured a multi-organization Army laboratory data collection process to support Army technology readiness level demonstrations and to enable consistent data structure/interoperability for multi-organization use throughout the development/design cycle;			

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army		DATE: February 2011
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 2010	FY 2011	FY 2012
assessed and improved current analysis tools to provide an integrated acquisition support capability for Army decision making; improved simulation for modeling of weather, terrain, chemical-biological-radiological-nuclear effects, human behavior, human decision-making and networked sensor fusion; and improved M&S support architectures for cross-domain M&S environment interoperability to include live fire testing, Soldier and hardware-in-the-loop experiments, and software-based testing environments. ***FY 2011 Plans:*** Demonstrate cross-command data collection and analysis tools for integrated acquisition support capability; mature integrated M&S representation of Battle Command (future force network planning, pre-operation checkout, and integration with tactical command and control devices); integrate M&S support architectures for cross-domain M&S environment interoperability; and fuse 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:*** Will 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; will demonstrate executable architectures for analysis, event management, and simulation initialization, on the RDECOM Virtual Testbed; will research and identify hardware and software technology solutions for current and future M&S challenges, concentrating on distributed execution of M&S.			
Accomplishments/Planned Programs Subtotals	10.103	4.900	8.730

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 2012 Army			DATE: February 2011
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 S33: *TRAINING AND SIMULATION SYSTEMS INITIATIVES (CA)*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
S33: *TRAINING AND SIMULATION SYSTEMS INITIATIVES (CA)*	5.253	-	-	-	-	-	-	-	-	Continuing	Continuing

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Training and Simulation Systems advanced technology development. Joint Medical Simulation Technology Research & Development Center. Supported collaboration between defense organizations conducting research and development in medical modeling and simulation for training, therapy, and rehabilitation.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Title: Joint Medical Simulation Technology Research & Development Center ***Description:*** This is a Congressional Interest Item. ***FY 2010 Accomplishments:*** Supported collaboration between defense organizations conducting research and development in medical modeling and simulation for training, therapy, and rehabilitation.	1.773	-	-
Title: HapMed Combat Medic Trainer ***Description:*** This is a Congressional Interest Item. ***FY 2010 Accomplishments:*** Investigated technology options to provide soldiers and medics with the ability to practice critical lifesaving tasks in realistic training scenarios.	0.990	-	-
Title: Combat Medic Trainer ***Description:*** This is a Congressional Interest Item. ***FY 2010 Accomplishments:*** Assessed technology options for developing a leg tourniquet trainer and a needle chest decompression trainer.	2.490	-	-
Accomplishments/Planned Programs Subtotals	5.253	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army		DATE: February 2011
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 S33: *TRAINING AND SIMULATION SYSTEMS INITIATIVES (CA)*

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.