Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army											Date: March 2019	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603015A *I Next Generation Training & Simulation Systems*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	-	15.778	28.650	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	44.428
S28: *Immersive Learning Environments*	-	0.464	3.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	3.464
S29: *Modeling & Simulation - Adv Tech Dev*	-	6.023	17.122	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	23.145
S31: *Modeling And Simulation Infrastructure Technology*	-	9.291	8.528	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	17.819

Note

In Fiscal Year (FY) 2020 this Program Element (PE) is being eliminated, with continuity of effort realigned to the following PE:
? 0603118A Soldier Lethality Advanced Technology

A. Mission Description and Budget Item Justification

This 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 Technologies (ICT) at the University of Southern California. 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 0602785A (Manpower/Personnel/Training Technology), PE 0602787A (Medical Technology) and PE 0603007A (Manpower, Personnel and Training Advanced Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy. FY 2020 adjustments align program financial structure to Army Modernization Priorities in support of the National Defense Strategy.

Work is performed by the U.S. Army Futures Command.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603015A *I Next Generation Training & Simulation Systems*

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	16.434	25.682	26.471	-	26.471
Current President's Budget	15.778	28.650	0.000	-	0.000
Total Adjustments	-0.656	2.968	-26.471	-	-26.471
• Congressional General Reductions	-0.013	-0.032			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	3.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.643	-			
• Adjustments to Budget Years	-	-	-26.471	-	-26.471

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2018	FY 2019
Project: S28: *Immersive Learning Environments*		
Congressional Add: *Program increase - Immersive Learning Environments*	-	3.000
Congressional Add Subtotals for Project: S28	-	3.000
Congressional Add Totals for all Projects	-	3.000

Change Summary Explanation

FY19 congressional add for immersive learning environments ($3.000 million).
In FY20, this Program Element is eliminated as part of the Science and Technology portfolio restructure to align Army Modernization Priorities in support of the National Defense Strategy.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603015A / *Next Generation Training & Simulation Systems*	Project (Number/Name) S28 / *Immersive Learning Environments*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
S28: *Immersive Learning Environments*	-	0.464	3.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	3.464

Note

In FY 2019, this Project received a congressional add ($3.0 Million). There are no planned efforts beyond FY 2019 for this Project.

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 for Creative Technologies (ICT) University Affiliated Research Center (UARC) at the University of Southern California to develop training demonstrators. These demonstrators focus on urban operations, asymmetric warfare, resilience and rehabilitation to support Warfighting units and Army Institutions (Army Training and Doctrine Command (TRADOC) and Army Medical Command (MEDCOM)). 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.

The cited work is consistent with the S&T priorities of the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

In FY 2019, this Project received a congressional add ($3.0 Million). There are no planned efforts beyond FY 2019 for this Project.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
Title: Immersive Techniques for Training Applications	0.464	-	-
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. This effort completes in FY 2018.			
Accomplishments/Planned Programs Subtotals	0.464	-	-

	FY 2018	FY 2019
Congressional Add: Program increase - Immersive Learning Environments	-	3.000

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603015A / *Next Generation Training & Simulation Systems*	**Project (Number/Name)** S28 / *Immersive Learning Environments*

	FY 2018	FY 2019
FY 2019 Plans: Program increase - Immersive Learning Environments		
Congressional Adds Subtotals	-	3.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603015A / *Next Generation Training & Simulation Systems*	Project (Number/Name) S29 / *Modeling & Simulation - Adv Tech Dev*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
S29: *Modeling & Simulation - Adv Tech Dev*	-	6.023	17.122	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	23.145

Note

In Fiscal Year (FY) 2020 this Project is being realigned to:
Program Element (PE) 0603118A Soldier Lethality Advanced Technology, Projects:
* BC8 Training Advanced Technology (Other than Synthetic Training Environment (STE))
* BE9 Synthetic Training Environment (STE) technology

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 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; 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 Corps forces.

The cited work is consistent with the S&T priorities of the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy. FY 2020 realignments are due to financial restructuring in support of Army Modernization Priorities.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
Title: Training Effectiveness	1.300	1.300	-
Description: This research addresses the effectiveness of training Soldiers and teams in immersive environments. This effort will research and develop simulations to determine the interaction of realism, immersion, acceptance, and training effectiveness. A baseline of the key dimensions of realism and immersion for current training systems will be developed and will be extended to generate guidelines for the development of future training technologies. Cost effectiveness of these training components will also be considered.			
FY 2019 Plans: Mature and demonstrate automated training performance assessment algorithms for individuals in virtual training environments; provide a baseline of measures and methods for use in assessing effectiveness of collective training for a subset of technologies			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603015A / *Next Generation Training & Simulation Systems*	**Project (Number/Name)** S29 / *Modeling & Simulation - Adv Tech Dev*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
used in various training environments (mixed reality and live); identify impacts and tradeoffs associated with effectiveness of collective training using current (training) simulation architectures and the expected effectiveness of collective training associated with using future training technologies (mixed reality and live). ***FY 2019 to FY 2020 Increase/Decrease Statement:*** This effort concludes in FY19.			
Title: Mixed and Augmented Reality ***Description:*** This effort matures and demonstrates mixed and augmented reality technologies that seamlessly blend synthetic and real environments to provide a more realistic training environment for Soldiers. Efforts matured by this effort transition to PEO-STRI. ***FY 2019 Plans:*** Mature and begin internal demonstrations of Augmented Reality subcomponents such as advanced optics for the helmet mounted display, occlusion, and increased computational of the man-wearable computer to reduce size, weight, power, and cooling while also reducing logistics to enable a future augmented reality training environment that can represent the complexities of the future operational environment within which soldiers must operate. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** PE 0603015A / Project S29 will be funded in PE 0603118A / Projects BC8 (Training Advanced Technology (Other than STE)) and BE9 (STE Advanced Technology)	4.723	4.151	-
Title: Mixed and Augmented Reality for Complex Environments ***Description:*** This effort matures and demonstrates the models and simulations that enable immersive training in future complex operational environments involving megacity terrain and unmanned autonomous systems. These technologies support the Army capability needs for the soldier to have better asymmetric vision and decide faster for dismounted soldiers in a complex urban environment. ***FY 2019 Plans:*** Mature modeling and simulations for megacities environments that will be used for urban interactive immersive training capability, components will include the simulated terrain environment representing complex and dense urban environments as well as manned/unmanned teaming models; mature the components of the dismounted soldier augmented reality visual system and occlusion algorithms for manned/unmanned teaming training operations. ***FY 2019 to FY 2020 Increase/Decrease Statement:***	-	1.144	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603015A / *Next Generation Training & Simulation Systems*	**Project (Number/Name)** S29 / *Modeling & Simulation - Adv Tech Dev*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
PE 0603015A / Project S29 will be funded in PE 0603118A / Projects BC8 (Training Advanced Technology (Other than STE)) and BE9 (STE Advanced Technology)			
Title: Synthetic Training Environment Acceleration ***Description:*** This effort matures and demonstrates technologies to enable a Synthetic Training Environment which is a single, interconnected training system in which units from squad through ASCC can train in the most appropriate domain - live, virtual, constructive, and gaming, or in all four simultaneously. ***FY 2019 Plans:*** Mature and demonstrate training simulation software technologies, which enable the representation of a relevant Multi Domain Battle (MDB) within a global terrain, in direct support of the Army?s synthetic training environment; optimize the use of distributed computing and cloud infrastructures to demonstrate dynamic content updates (e.g. terrain) and point-of-need training, including the maturation of human-machine interfaces; exploit the maturations in fidelity of the global terrain, the increase in simulated entities and increase concurrent role-players for demonstration in a relevant collective training exercise. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** PE 0603015A / Project S29 will be funded in PE 0603118A BE9 (STE Advanced Technology)	-	9.900	-
Title: FY 2019 SBIR / STTR Transfer ***Description:*** FY 2019 SBIR / STTR Transfer ***FY 2019 Plans:*** FY 2019 SBIR / STTR Transfer ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY 2019 SBIR / STTR Transfer	-	0.627	-
Accomplishments/Planned Programs Subtotals	6.023	17.122	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603015A / *Next Generation Training & Simulation Systems*	**Project (Number/Name)** S29 / *Modeling & Simulation - Adv Tech Dev*

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603015A / *Next Generation Training & Simulation Systems*	Project (Number/Name) S31 / *Modeling And Simulation Infrastructure Technology*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
S31: *Modeling And Simulation Infrastructure Technology*	-	9.291	8.528	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	17.819

Note

In Fiscal Year (FY) 2020 this Project is being realigned to:
Program Element (PE) 0603118A Soldier Lethality Advanced Technology, Projects:
* BC4 Soldier Decision Making & Comms Performance Advanced Technology
* BC8 Training Advanced Technology (Other than Synthetic Training Environment (STE))
* BE9 STE Advanced Technology

A. Mission Description and Budget Item Justification

This Project matures and demonstrates 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 (LVC) experimentation. This effort focuses on researching cutting-edge M&S methods to enable the Army and the Department of Defense (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.

Efforts in this Project support the Under Secretary of Defense for Research and Engineering S&T priorities and the Army Modernization Strategy.

FY 2020 realignments are due to financial restructuring in support of Army Modernization Priorities.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
Title: Simulation Tools and Models	7.391	6.216	-
Description: This effort matures and demonstrates modeling & simulation (M&S) technologies and techniques that support training and experimentation to assess and support system acquisition and military planning decision-making and System of Systems architecture, technology tradeoffs, etc. This research transitions to the U.S Army Program Executive Office for Simulation, Training and Instrumentation (PEO STRI).			
FY 2019 Plans: Demonstrate simulation architecture technologies for a single synthetic environment that supports multiple M&S Communities in a relevant context; optimize composable modeling methods focused on broad model reuse; improve repeatable measurement			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603015A / *Next Generation Training & Simulation Systems*	**Project (Number/Name)** S31 / *Modeling And Simulation Infrastructure Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
methodologies for human behavior modeling; refine visualization and interaction technologies that improve human-computer interaction for training simulation; mature cyber data exchange models to enhance synthetic and live integrated training. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** PE 0603015A / Project S31 will be funded in PE 0603118A / Projects BC4 (Soldier Decision Making & Comms Performance AdvTech), BC8 (Training Adv Technology (Other than STE) and BE9 (STE Advanced Technology) for FY 2020 as part of the financial restructure.			
Title: Early Human Systems Integration Demonstrations ***Description:*** This effort will mature and demonstrate state of the art methods, tools and techniques to integrate human systems integration (HSI) early in the science and technology (S&T) and requirements analysis process to ensure effective and efficient design and development of future Soldier systems. The goal of this effort is to demonstrate the effect early HSI can have on developing the most effective, efficient, and affordable design and on predicting and improving total system performance. This effort is coordinated with the U.S. Army Human Systems Integration Directorate, G1. ***FY 2019 Plans:*** Develop enhanced Soldier performance metrics and training development tools; identify technologies to improve early system design using Soldier-centered design tools and systems engineering architecture. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** PE 0603015A / Project S31 will be funded in PE 0603118A / Projects BC4 (Soldier Decision Making & Comms Performance AdvTech), BC8 (Training Adv Technology (Other than STE) and BE9 (STE Advanced Technology) for FY 2020 as part of the financial restructure.	1.900	2.000	-
Title: FY 2019 SBIR / STTR Transfer ***Description:*** FY 2019 SBIR / STTR Transfer ***FY 2019 Plans:*** FY 2019 SBIR / STTR Transfer ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY 2019 SBIR / STTR Transfer	-	0.312	-
Accomplishments/Planned Programs Subtotals	9.291	8.528	-

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603015A / *Next Generation Training & Simulation Systems*	**Project (Number/Name)** S31 / *Modeling And Simulation Infrastructure Technology*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A