Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603118A / *Soldier Lethality Advanced Technology*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	131.119	151.370	107.966	-	107.966	-	-	-	-	-	-
AY5: *Soldier Squad Small Arms Armaments Advanced Tech*	-	7.671	9.797	11.447	-	11.447	-	-	-	-	-	-
AY7: *Small Arms Fire Control Advanced Technology*	-	12.350	13.465	13.094	-	13.094	-	-	-	-	-	-
AY9: *Body Armor & Integrated Headborne Advanced Tech*	-	14.200	9.648	7.717	-	7.717	-	-	-	-	-	-
AZ6: *Soldier Signature Management Advanced Technology*	-	1.640	1.685	2.969	-	2.969	-	-	-	-	-	-
AZ8: *Soldier Squad Small Arms Armaments Adv Tech*	-	2.085	-	-	-	-	-	-	-	-	-	-
BB3: *Dismounted Soldier Survivability Equip/Tech Integ*	-	1.406	1.277	3.026	-	3.026	-	-	-	-	-	-
BB6: *Physical Augmentation: Adv Tech for Field Demo*	-	3.836	2.899	-	-	-	-	-	-	-	-	-
BB8: *Soldier Centric Advanced Technology*	-	7.476	5.880	5.292	-	5.292	-	-	-	-	-	-
BC1: *Human Performance AdvTech for Mobility & Lethality*	-	4.633	11.380	14.003	-	14.003	-	-	-	-	-	-
BC4: *Soldier Decision Making&Comms Performance AdvTech*	-	1.918	1.925	-	-	-	-	-	-	-	-	-
BC8: *Training Advanced Technology (Other than STE)*	-	1.280	4.307	2.993	-	2.993	-	-	-	-	-	-
BC9: *Adv Soldier Sensors/ Displays AdvTech for Dismounts*	-	13.097	10.792	13.163	-	13.163	-	-	-	-	-	-
BD7: *Soldier Sys Interfaces/ Integration-Sensor AdvTech*	-	9.273	8.741	8.374	-	8.374	-	-	-	-	-	-

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army												Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603118A / *Soldier Lethality Advanced Technology*							
BD9: *Soldier & Sm Unit Tactical Energy AdvTech*	-	2.973	3.141	3.184	-	3.184	-	-	-	-	-	-
BE2: *Joint Service Combat Feeding Advanced Technology*	-	1.709	2.367	2.424	-	2.424	-	-	-	-	-	-
BE5: *Personnel & Airdrop Safety Advanced Technology*	-	6.491	6.076	6.879	-	6.879	-	-	-	-	-	-
BE9: *STE Advanced Technology*	-	21.581	12.790	13.401	-	13.401	-	-	-	-	-	-
BS8: *Soldier Lethality Advanced Technology*	-	17.500	45.200	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

This PE matures and demonstrates Soldier Lethality technologies that improve Soldier operational performance by increasing lethality, mobility, protection, and optimizing situational awareness across the spectrum of operating environments and missions. This PE matures Soldier weapons and enabling components / subsystems, demonstrates lethal weapons systems with potential to provide greater lethality, target acquisition, fire control, and range at a significantly reduced weight for optimized Soldier and Small Unit system performance. The major focus areas for Soldier Lethality Science and Technology are Soldier weapons and ammunition technologies, protection technologies, cognitive and physical performance measures, training in synthetic training environments, and mission support capabilities such as situational awareness sensors and displays, dismounted power and energy technologies, and Soldier and Small Unit sustainment capabilities. This technology diverse PE also matures and demonstrates sensor technologies that increase Warfighter situational understanding, survivability, and lethality by providing sensor capabilities to acquire and engage all targets and threats at longer ranges in complex environments and operational conditions (e.g. day/night, obscured, smoke, adverse weather, and other degraded visual environments), and for advancing live training technologies that accurately replicate and realistically represent the effects of current and future weapons systems during force-on-force and force-on-target training. This PE matures and demonstrates effective technology in personal combat clothing, protective equipment such as personal armor, helmets, and eyewear, combat rations, shelters, logistical support items for aerial delivery of personnel and cargo, and energy systems to power current and emerging Soldier-born ISR, sensor, optical, and communication systems with the least weight and sustainment burden on the Soldiers and Small Combat Units. This PE matures and demonstrates technologies supporting the Army's Synthetic Training Environment (STE), a single, interconnected synthetic training system that will enable Army units and leaders to conduct realistic multi-echelon / multi-domain combined arms maneuver and mission command training, increasing proficiency through repetition. A specific research thrust area is applying systems-based practices to mature and demonstrate scientific and tailored knowledge of Soldiers' physical and cognitive architecture to facilitate rapid and efficient designs, assessments and trade-off analyses of technology insertions on the Soldier. Significant S&T investments are directed to improve the effectiveness of the technologies a Soldier utilizes while reducing the size and weight of the form factor of the equipment.

Work in this PE complements PE 0602143A (Soldier Lethality Technology).

All FY21 adjustments align program financial structure to Army Modernization Priorities in support of the National Defense Strategy.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army	Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603118A *I Soldier Lethality Advanced Technology*

Work in this Project is performed by the United States Army Futures Command.

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	135.968	109.608	112.771	-	112.771
Current President's Budget	131.119	151.370	107.966	-	107.966
Total Adjustments	-4.849	41.762	-4.805	-	-4.805
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	17.500	45.200			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-17.500	-			
• SBIR/STTR Transfer	-4.849	-3.438			
• Adjustments to Budget Years	-	-	-4.805	-	-4.805

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2020	FY 2021
Project: BS8: *Soldier Lethality Advanced Technology*		
Congressional Add: *Subterranean Warfighter Advanced Technology*	1.500	-
Congressional Add: *Rapid Safe Advanced Materials*	6.000	-
Congressional Add: *Multi-Spectral Sensor Mitigation*	5.000	-
Congressional Add: *Helmet Pad Suspension Systems*	5.000	-
Congressional Add: *Program increase - advanced AI/AA analytics for modernization and readiness*	-	10.000
Congressional Add: *Program increase - small arms fire control advanced technology*	-	8.000
Congressional Add: *Program increase: Advanced technology for maneuver support and protection*	-	10.000
Congressional Add: *Program increase - military engineering technology for infield waste*	-	2.000
Congressional Add: *Program increase - flexible LED lighting for tents and shelters*	-	5.200
Congressional Add: *Program increase*	-	10.000
Congressional Add Subtotals for Project: BS8	17.500	45.200
Congressional Add Totals for all Projects	17.500	45.200

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army	Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603118A *I Soldier Lethality Advanced Technology*

Change Summary Explanation

FY20 increase related to FY20 Congressional Adds.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / *Soldier Lethality Advanced Technology*	Project (Number/Name) AY5 / *Soldier Squad Small Arms Armaments Advanced Tech*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
AY5: *Soldier Squad Small Arms Armaments Advanced Tech*	-	7.671	9.797	11.447	-	11.447	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project demonstrates individual and crew-served weapon designs and technologies that enhance the fighting capabilities and survivability of the dismounted Warfighter in support of the Army's Soldier Lethality Modernization priority and all of the Services. All work is led by the Joint Service Small Arms Program (JSSAP) and is based upon the Joint Service Small Arms Master Plan (JSSAMP) and the Joint Capabilities Integration Development System's Small Arms Analyses.

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

This effort complements work done in PE 0602143A (Soldier Lethality Technology) / AY6 (Soldier Squad Small Arms Armaments Technology).

Work in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Small Arms Technology Demonstration	7.671	2.900	4.899
Description: This effort matures and demonstrates the Next Generation Family of Ammunition by optimizing small arms ammunition and weapon system technologies for integration into live fire demonstrations. It refines weapon system integration and supports the Joint Warfighter's small arms capability needs as well as validates small arms weapon system technology readiness levels and confidence of design functionality in advanced operating scenarios.			
FY 2021 Plans: Demonstrate emerging small arms technologies in current and next generation weapon systems to address sustained suppressive and precise lethal fires for area target capability gaps for improved effectiveness at extended ranges; optimize and integrate technology components for the weapon system to achieve enhanced controllability, reduced recoil, and increased accuracy; mature weapon sensors for enhanced aiming.			
FY 2022 Plans: Will mature and demonstrate technological advancements of small arms systems in relevant environments; mature and demonstrate automated target recognition and engagement technologies, signature reduction devices, technologies and evaluations for legacy and Next Gen weapons, ammunition design optimizations for novel targets, augmented weapon system			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*	**Project (Number/Name)** AY5 / *Soldier Squad Small Arms Armaments Advanced Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
controllability, and advanced optical systems with machine learning algorithms for technology insertions into emerging systems identified by the Joint Warfighters. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase provides for further maturation of prior 6.2 investments into TRL 6 technology demonstrations and transitions to the PMs focused on dismounted Soldier improvements in denied and austere environments in the areas of remote powered armament systems, increased probability of hit, Next Generation Soldier Weapon supporting technologies, signature reduction technologies, and small arms lethality increases.			
Title: Next Generation Family of Ammo ***Description:*** This effort matures and demonstrates the next generation of small arms live training ammunition by optimizing it through integration into new weapon systems that will provide an increased level of lethality. ***FY 2021 Plans:*** Mature and demonstrate integrated technologies for the combat tracer and reduced range tracer concept projectiles of the NGFoA to validate tracer concept designs for aligning the tracer ammunition effort with conventional ammunition and the Next Generation Soldier Weapon (NGSW). ***FY 2022 Plans:*** Will improve performance of initial base technologies of the combat tracer and reduced range tracer concepts to validate and demonstrate capability as fully functional projectiles. Ammunition effort aligned with the Next Generation Squad Weapon (NGSW). ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Decrease follows the lifecycle glide path with reduced workload expected with FY22 as final year of execution.	-	6.897	6.548
Accomplishments/Planned Programs Subtotals	7.671	9.797	11.447

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603118A / *Soldier Lethality Advanced Technology*				Project (Number/Name) AY7 / *Small Arms Fire Control Advanced Technology*			
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
AY7: *Small Arms Fire Control Advanced Technology*	-	12.350	13.465	13.094	-	13.094	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates fire control and targeting sensor technologies and techniques to improve targeting and lethality in order to maintain overmatch at longer ranges in all operational environments and to meet the capability needs of Army Science and Technology Soldier Lethality, Next Generation Combat Vehicle, and Long Range Precision Fires modernization priorities.

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

This effort complements work done in PE 0602143A (Soldier Lethality Technology) / AY8 (Small Arms Fire Control Technology).

Work in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Small Arms Fire Control Advanced Technology	12.350	13.465	11.738
Description: This effort will mature and demonstrate fire control and targeting sensor technologies and techniques to improve targeting and lethality, and maintain overmatch at longer ranges in all environments. This effort is coordinated with PE 0602143A (Soldier Lethality Technology), PE 0602145A (Next Generation Combat Vehicle Technology), 0603462A (Next Generation Combat Vehicle Advanced Technology), and PE 0603463A (Network C3I Advanced Technology). ***FY 2021 Plans:*** Mature and optimize sensor designs to create a next generation, digital weapon sight fire control system; demonstrate a modular, multispectral, digital weapon sensor demonstrator to enhance Soldier targeting and lethality; mature individual weapon sight fire control system prototype based on user feedback to provide a far target location capability; validate illuminator and designator laser sources, and multifunction sensor system for fire support and dismounted Scout operations; optimize image processing approaches for initial demonstration. ***FY 2022 Plans:*** Will complete maturation of digital weapon sight fire control system prototypes; demonstrate final digital weapon sight configuration; execute technology demonstrations in relevant environments to support system optimization of target handoff and target cueing capabilities; optimize capability to enable seamless integration with Enhanced Night Vision Goggle-Binocular			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*	**Project (Number/Name)** AY7 / *Small Arms Fire Control Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
(ENVG-B), Integrated Visual Augmentation System (IVAS), and Next Generation Squad Weapon (NGSW); complete prototype integration for fire support and dismounted scout operations; demonstrate multifunction precision targeting capabilities in military relevant environments. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funding decrease in this task reflects the separation of Advanced Fire Control Technology into a unique task for FY 2022 and beyond. Demonstrations of hardware for task complete in final year.			
Title: Advanced Fire Control Tech ***Description:*** This effort will mature and demonstrate fire control and targeting sensor technologies and techniques to improve targeting and lethality, and maintain overmatch at longer ranges in all environments. This effort is coordinated with PE 0602143A (Soldier Lethality Technology), PE 0602145A (Next Generation Combat Vehicle Technology), 0603462A (Next Generation Combat Vehicle Advanced Technology), and PE 0603463A (Network C3I Advanced Technology). ***FY 2022 Plans:*** Will mature and demonstrate technologies of integrated circuit boards to improve performance and reliability under pyro-shock and reduced power consumption ***FY 2021 to FY 2022 Increase/Decrease Statement:*** This task was part of the Soldier Squad Small Arms Armaments Advanced Technology Project Task in FY 2021, and has been separated in FY 2022 and beyond for greater emphasis. Increase in FY 2022 is due to ramp up of task execution from requirements generation to tech maturation and demonstrations.	-	-	1.356
Accomplishments/Planned Programs Subtotals	12.350	13.465	13.094

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / *Soldier Lethality Advanced Technology*	Project (Number/Name) AY9 / *Body Armor & Integrated Headborne Advanced Tech*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
AY9: *Body Armor & Integrated Headborne Advanced Tech*	-	14.200	9.648	7.717	-	7.717	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates body armor weight reductions and improves the performance of personal protection and survivability equipment. It also demonstrates combat helmet ballistic, blast, and small arms protection performance enhancements and the integration and optimization of power, energy, and digital sensor and display headborne technologies.

This effort supports Force Protection capability demonstrations for Soldiers and Small Units and demonstrated technologies from this effort transition to various Program Executive Office (PEO) Soldier programs. This effort complements work done in PE 0602143A (Soldier Lethality Technology) / AZ2 (Body Armor & Integrated Headborne Technology).

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

Work in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Body Armor & Integrated Headborne Advanced Technology	14.200	9.648	7.717
Description: This effort focuses on maturing, integrating and demonstrating personal protective capabilities against ballistic, blast, and directed energy threats as well as the development and demonstration of Soldier worn platform architectures to optimize the integration of personal protective equipment and Soldier lethality enabling technologies. Demonstrates advanced test methods to validate personal protective equipment performance enhancements against current and emerging small arms, fragmentation, and blast threats from anti-personnel munitions. The objective of these technology development efforts is to significantly increase Soldier lethality by enhancing the protective capabilities and reducing sub-system and system-level weight of individual protective equipment to reduce the Soldier burden and increase survivability.			
FY 2021 Plans: Mature body armor systems for protection against emerging small arms threats; optimize system level testing of body armor against small arms threats with the objective of capturing high rate force profiles to better understand injury mechanics of blunt trauma to inform future requirements that link to injury criteria; improve the helmet system design by applying human systems			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*	**Project (Number/Name)** AY9 / *Body Armor & Integrated Headborne Advanced Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
integration practices to the incorporation of multiple protective and situational awareness technologies required for the Integrated Headborne System to improve helmet ergonomics, stability, and headborne load distribution. ***FY 2022 Plans:*** Will exploit state of the art high performance ballistic materials for body armor against small arms threats to provide trade space analysis regarding art of the possible to Army stakeholders and inform future requirements for torso protection against small arms threats; Exploit novel and emerging processing techniques and latest developmental materials for combat helmets to assess state of the art helmet performance against small arms threats and inform future protection requirements for Army combat helmets; Design power and data interface architectures for combat helmets to develop common interface design standards for Soldier headborne technology; Develop communication headset subsystems with new wireless down links to the individual radio and integrate preliminary enhanced audio capabilities to provide hearing protection and situational awareness cues. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Decrease in funding reflects planned lifecycle of this effort. FY 2022 funding levels decrease to focus development toward a new capability for emerging small arms threat defeat and anti-personnel munitions protection.			
Accomplishments/Planned Programs Subtotals	14.200	9.648	7.717

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army												Date: May 2021
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603118A / *Soldier Lethality Advanced Technology*				Project (Number/Name) AZ6 / *Soldier Signature Management Advanced Technology*			
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
AZ6: *Soldier Signature Management Advanced Technology*	-	1.640	1.685	2.969	-	2.969	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project optimizes, matures and demonstrates advances in novel materials, technologies, techniques and applications increasing the capabilities of camouflage and concealment against known and emerging sensor threats, providing effective deception capabilities, as well as combinations of physical and electronic signature decoy components and maturing analytical processes for modeling performance of signature management technologies during multi-domain operations. These technologies will produce proof of concept systems that decrease the probability of detection and targeting by peer and near-peer adversaries, enabling freedom of movement of semi-independent and dispersed formations and increased protection of high-valued assets. Demonstrations conducted under this Project will support Science and Technology efforts in Soldier Lethality protection/survivability Projects will provide disruptive Camouflage, Concealment and Deception technologies to the Operational Army, supporting expeditionary maneuver in the Multi-Domain Battle Environment to open and retain windows of advantage.

Work in this Project supports key Army needs and leverages/complements the technical research of several PEs and Projects to include PE 0602143 (Soldier Lethality Technology) / BB4 (Dismounted Soldier Survivability Materials), AZ5 (Soldier Protection Technology - Vulnerability), BE1 (Support Technology to Mission Command), AZ9 (Soldier - Small Unit Detectability Technology); PE 0601102A (Defense Science Research); and PE 0602145A (Next Generation Combat Vehicle Technology) BI2 (Sensor Protection Technology).

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

Work in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Soldier Camouflage, Concealment and Decoys Demonstration	1.640	1.685	2.969
Description: This effort demonstrates innovative camouflage, concealment, and deception technologies for the dismounted Soldier to defeat advanced current and emerging adversary Intelligence, Surveillance and Reconnaissance (ISR) threats and to reduce the probability of detection and identification across the electromagnetic spectrum. Matures physics-based models for material and system performance that support probability of detection metrics in the multi-domain operational environment, assisting to close the capability gap between current camouflage, concealment, and deception technologies and defeating enemy sensorial capabilities in future operating environments.			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*	**Project (Number/Name)** AZ6 / *Soldier Signature Management Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
FY 2021 Plans: Demonstrates textile coatings and garment designs for Soldier clothing and individual equipment to reduce the probability of Soldier detection from battlefield thermal sensors while integrating other key garment performance requirements; optimizes the balance between detection, protection, comfort and durability of clothing systems; matures and demonstrates topical applications to conceal exposed skin (i.e. face, hands) from thermal sensors; validate the visual, infrared, and radar signatures of Soldiers wearing current clothing and individual equipment. ***FY 2022 Plans:*** Will optimize down- selected textile coatings and functional garment designs for Soldier clothing and individual equipment to inconspicuously transfer Soldier thermal emissions away from the Soldier?s body to reduce the probability of Soldier detection from battlefield thermal sensors while integrating other key garment performance requirements; continue to mature and demonstrate additional topical applications using engineered optical materials within binder agents to conceal exposed skin (i.e., face, hands) from thermal sensors; collect imagery data of Soldiers and squad formations against ground and aerial sensor threats in multiple bands of the electromagnetic spectrum to assess highest impact improvement opportunities; apply newly developed aided target detection techniques against Soldier camouflage and concealment capabilities to assess Soldier detectability capability gaps against emerging threat sensors and sensor platform. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funding realigned from PE 0602143A (Soldier Lethality Technology) / AZ9 (Soldier Protection Advanced Tech ? Detectability) to support planned field demonstrations of several signature management capabilities and the associated test costs to cover data acquisition teams, sensor deployment and test site utilization. Planned technologies include combat uniforms with technology intended to camouflage Soldier thermal signatures as well as face paints to conceal the thermal signature of Soldiers exposed skin to include hands and face requiring test events in multiple geographic locations and environments.			
Accomplishments/Planned Programs Subtotals	1.640	1.685	2.969

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / *Soldier Lethality Advanced Technology*	Project (Number/Name) AZ8 / *Soldier Squad Small Arms Armaments Adv Tech*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
AZ8: *Soldier Squad Small Arms Armaments Adv Tech*	-	2.085	-	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2021 this Project is realigned to:
PE 0603463A (Network C3I Advanced Technology)
* Project AQ1 (Spectrum Obfuscation Advanced Technology)

A. Mission Description and Budget Item Justification

This Project optimizes, matures and demonstrates novel materials, technologies, techniques and applications that increase camouflage and concealment capabilities for high-value assets against known and emerging sensor threats, provides effective deception capabilities, matures analytical processes for modeling performance of signature management technologies during multi-domain operations as well as develops combinations of physical and electronic signature decoy components. These technologies will produce proof of concept system demonstrators that decrease the probability of detection and targeting by peer and near-peer adversaries, enabling freedom of movement of semi-independent and dispersed formations and increased protection of high-valued assets. Demonstrations conducted under this project will support S&T efforts in Soldier Lethality protection/survivability projects providing disruptive Camouflage, Concealment and Deception technologies to the Operational Army, supporting expeditionary maneuver in the Multi-Domain Battle Environment to open and retain windows of advantage.

Work in this Project supports key Army needs and leverages/complements the technical research of several PEs and Projects to include 0601102A (Defense Science Research), PE 0602143A (Soldier Lethality Technology) / BB4 (Dismounted Soldier Survivability Materials), AZ5 (Soldier Protection Technology - Vulnerability), BE1 (Support Technology to Mission Command), AZ9 (Soldier-Small Unit Detectability Technology), and PE 0602145A (Next Generation Combat Vehicle Technology) / BI2 (Sensor Protection Technology).

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

Work in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: High-Value Asset Camouflage, Concealment and Decoys Demonstration	2.085	-	-
Description: This effort demonstrates innovative camouflage, concealment and deception technologies for high-value assets to defeat advanced current and emerging adversary Intelligence, Surveillance and Reconnaissance (ISR) threats, including multispectral, hyperspectral and Light Detection and Ranging (LiDAR) sensors, and to reduce the probability of detection			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*	**Project (Number/Name)** AZ8 / *Soldier Squad Small Arms Armaments Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
in multi-domain operations. Matures physics-based models for material and system performance that support probability of detection metrics in the multi-domain operational environment, assisting in closing the capability gap between current camouflage, concealment and deception technologies and defeating enemy sensorial capabilities in future operating environments.			
Accomplishments/Planned Programs Subtotals	2.085	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / *Soldier Lethality Advanced Technology*	Project (Number/Name) BB3 / *Dismounted Soldier Survivability Equip/Tech Integ*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
BB3: *Dismounted Soldier Survivability Equip/Tech Integ*	-	1.406	1.277	3.026	-	3.026	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates the integration of Soldier survivability materials and technologies to increase the speed and efficiency of dismounted Soldier movement and maneuver. This Project focuses on reducing Soldier worn equipment weight, improving Soldier and system integration and reducing the dismounted Soldier's detectability, susceptibility, and vulnerability to operational threats. Operational threats are characterized as combat threats (e.g. flame and thermal, blast and ballistic, multispectral sensors, and laser threats), environmental threats (e.g. cold, heat, wet, vector, water contamination, concealment, etc.), and Soldier system components and system limitations (e.g. size, weight, and bulk). This Project includes the demonstration and validation of integrated technologies, novel subsystems/ systems, and test methods.

This Project complements work done in PE 0602143A (Soldier Lethality Technology) / Project BB4 (Dismounted Soldier Survivability Materials).

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

Work in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Dismounted Soldier Survivability Equipment and Technology Integration	1.406	1.277	3.026
Description: This effort matures and integrates multifunctional protective materials, sub-components, and systems for field demonstrations to significantly increase the survivability of the Soldier through their multi-functional clothing and individual protective equipment. This effort also demonstrates and validates tradeoff analyses in sub-component and system-level designs of ballistic, blast, signature management and integrated protection clothing and equipment technologies.			
FY 2021 Plans: Matures cold weather clothing technologies to provide weight reduction while improving protection to increase maneuverability of the Soldier in extreme climates; optimizes advanced textile printing processes for system integration of multiple functionalities (e.g. signature management, flame resistance, etc.) that will result in cost savings compared to current methods while creating durable clothing systems for Soldiers; integrates and demonstrates a water filtration capability designed to remove toxic chemical			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*	**Project (Number/Name)** BB3 / *Dismounted Soldier Survivability Equip/Tech Integ*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
threats from indigenous water sources, reducing the need for water carriage and ensuring hydration levels are maintained when in a contested re-supply operational environment. ***FY 2022 Plans:*** Will mature and optimize the systems engineering architecture, framework and physical demonstrator units that demonstrate integrated body-worn Soldier survivability technologies for Soldier user assessments in support of the Combat Protective Ensemble (CAPE) program; validate combat ensemble components that address gaps in extremities protection, thermal management, and moisture control through optimizing operational clothing and individual equipment for (1) temperate to extreme cold climates and (2) temperate to extreme heat and high humidity environments; exploit recent advancements in power and data transfer mechanisms to mature multiple candidate modular load management systems integrating body-worn power and data distribution to optimize the Soldier system integration of body-worn individual equipment with particular focus on system level weight reduction and enhanced ergonomics to greatly improve Soldier ability to shoot, move and communicate; validate and demonstrate maturing candidate camouflage and concealment materials from PE 0602143A (Soldier Lethality Technology) with a focus on visible through infrared bands of the electromagnetic spectrum; validate and demonstrate maturing high performance materials for integrated and modular ballistic and blast protection from PE 0602143A (Soldier Lethality Technology) against anti-personnel munitions and small arms threats. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funding increase reflects the required ramp up from concept generation to physical development and engineering cost requirements to launch component design iterations and physically validate the maturity and feasibility of follow-on integration and interface requirements of multiple technologies for the combat ensemble.			
Accomplishments/Planned Programs Subtotals	1.406	1.277	3.026

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / *Soldier Lethality Advanced Technology*	Project (Number/Name) BB6 / *Physical Augmentation: Adv Tech for Field Demo*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
BB6: *Physical Augmentation: Adv Tech for Field Demo*	-	3.836	2.899	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project investigates human augmentation technologies for enhanced Soldier mobility & lethality to provide an advantage over adversaries during close combat and infantry tasks. This will be achieved by demonstrating and validating operationally ready physical augmentation systems that meet the mission requirements by optimizing movement & maneuver and logistics sustainment task performance.

Work in this Project leverages research of several PEs and Projects including PE 0602143A (Soldier Lethality Technology) / Project BC2 (Next Gen Mobility & Lethality Tech for Warfighters), Project BB9 (Human Performance Technology for Mobility & Lethality), Project BB5 (Physical Augmentation: Tech for Human Interactions), and PE 0603118A (Soldier Lethality Advanced Technology) / Project BC1 (Human Performance AdvTech for Mobility & Lethality), and Project BB8 (Soldier Centric Advanced Technology). Additionally, work in this Project complements and is coordinated with Medical Research and Development Command and the Veteran Administration's exoskeleton research area. This Project is also coordinated with work performed across the DoD under the Reliance 21 Human Systems Community of Interest: Protection, Sustainment, and Warfighter Performance.

Results of these efforts may transition to the Program Executive Office (PEO) Soldier, Army Training and Doctrine Command (TRADOC), Human Systems Integration (HSI) Directorate (Army G1), and Army Test and Evaluation Command (ATEC).

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

Work in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Wearable Assistive Devices Advanced Technology for Feld Demo	3.836	2.899	-
Description: This effort demonstrates wearable physical augmentation devices to validate Soldier metrics such as endurance, survivability, speed, and strength, as well as system metrics such as power consumption and duration, actuator and controller performance, and integration with Soldier clothing and individual equipment (CIE). Results will demonstrate if the Army will benefit from leveraging industry investments and determine if these systems enhance Soldier mobility and lethality in operational environments.			
FY 2021 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*	**Project (Number/Name)** BB6 / *Physical Augmentation: Adv Tech for Field Demo*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Demonstrate and validate labor-intensive Field Artillery/ADA-focused augmentation/assist devices to optimize human performance; validate technical, physiological, and field demo data of assist devices and exoskeletons with objective measures of human performance, injury prevention/reduction, and identification of potential negative impacts of applying physical assist devices to Soldiers in military environments. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funding decreased to support PE 0602143A (Soldier Lethality Technology) / AY8 (Advanced Fire Control Tech) to address fire control acceleration.			
Accomplishments/Planned Programs Subtotals	3.836	2.899	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / *Soldier Lethality Advanced Technology*	Project (Number/Name) BB8 / *Soldier Centric Advanced Technology*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
BB8: *Soldier Centric Advanced Technology*	-	7.476	5.880	5.292	-	5.292	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project demonstrates optimized Warfighting function (e.g. shoot, move, perceive, decide, and communicate) with Soldier centric technologies, systems and/or subsystems designed to augment Soldier ability during missions. This Project capitalizes on operational partnerships by providing Science and Engineering subject matter experts (SMEs) the ability to assist Commanders in course of action development for potential near term solutions and condition setting for mid/far term science objectives. Provides Soldier assessments to optimize, improve performance, validate and integrate technologies and methodologies with users. Research focuses on the Warfighter as the capability and will rapidly iterate user driven solutions that maximize their tactical performance. This Project also matures and demonstrates Soldier centric technologies for the Soldier/Squad Virtual Trainer (S/SVT) to support the Army's Synthetic Training Environment (STE). The STE is the next generation holistic collective training capability that will train units where they will fight, with whom they will fight with, and in complex operational environments to include dense urban and sub-terrain; within the entire range of combined arms maneuver tasks in support of Multi-Domain Operations. The S/SVT system combines and integrates several individual Soldier and Squad training capabilities, STE Squad Capability (SSC), Weapon Skill Development (WSD), Joint Fires Training (JFT), and Use of Force (UoF), into a single capability that can be conducted simultaneously or individually and enable physical movement/exertion related to the execution of Soldier/Marine individual and Squad collective training tasks. The STE will provide the realistic repetitions necessary to fight 25 bloodless battles before the first battle; a Secretary of Defense priority.

This Project is fully coordinated with work done in PE 0602143A (Soldier Lethality Technology) and PE 0603118A (Soldier Lethality Advanced Technology) as well as work conducted by Medical Research & Development Command (MRDC), Army Research Institute (ARI), U.S. Military Academy (USMA), and other academic and industry partners. This work is in partnership with Forces Command (FORSCOM) operational units and the appropriate Training and Doctrine Command (TRADOC) organizations as well as established transition partners, including Army Test and Evaluation Command (ATEC) & Program Executive Offices.

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

Work in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Operational Unit Partnership and Soldier Touch Point	7.476	-	-
Description: This effort optimizes innovation through Science and Technology touch points with the Operational force, resulting in rapid iteration, concept maturation, integration, validation of laboratory findings, and transition of technologies and methodologies in response to operational unit demand signal. This effort streamlines demonstration, data collection, and technology maturation			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*	**Project (Number/Name)** BB8 / *Soldier Centric Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
for near term Doctrine, Organization, Training and Education, Materiel, Leadership, Personnel, and Facilities (DOTMLPF) solutions, enabling faster delivery of materiel and non-materiel products/knowledge refined with direct Soldier input. This body of work allows validated, empirical, assessment of any equipment capability or training intervention as part of the Soldier architecture to inform future acquisition investments, training, and operational trade space decisions.			
Title: STE Soldier/Squad Virtual Trainer ***Description:*** This effort matures and demonstrates a common battle drill squad-level mixed reality based system that allows for the rapid conduct and repetition of squad-level training. The training system will make it possible to conduct diverse, repeatable and effective training without extensive training infrastructure. This effort matures and demonstrates novel and realistic training environments that provide increased levels of proficiency and readiness through immersive training scenarios conducted at the point of need. ***FY 2021 Plans:*** Improve the performance of individual Soldier position and orientation tracking and mitigation of day and night lighting effects on augmented reality devices; and demonstrate multi-modal, Soldier interfaces (e.g. haptic suits, 3D sound, acoustics, etc.) into virtual environments. ***FY 2022 Plans:*** Will mature device agnostic camera and tracking technologies required for dynamic occlusion to successfully perform in all potential training environments; validate technologies that enhance immersion (haptic suits, 3D sound, etc.) for Soldier training in mixed reality environments; improve performance of weapon tracking algorithms by utilizing better processing technologies and deep learning algorithms using markerless tracking. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funding decrease supports shift to long-term objectives of merging live and synthetic training.	-	5.880	5.292
Accomplishments/Planned Programs Subtotals	7.476	5.880	5.292

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / *Soldier Lethality Advanced Technology*	Project (Number/Name) BC1 / *Human Performance AdvTech for Mobility & Lethality*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
BC1: *Human Performance AdvTech for Mobility & Lethality*	-	4.633	11.380	14.003	-	14.003	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures technologies, methodologies, and human performance models to demonstrate increased mobility & lethality of the individual and small unit to achieve overmatch. It validates and integrates human performance assessment methods and algorithms into training/education, test and evaluation methodologies, and materiel solutions to compare performance impacts between different materiel and non-materiel solutions to maximize the individual Warfighter and small unit. These methods and algorithms have potential to enable the development of aspects of doctrine, organization, training, materiel, leadership and education, personnel and facilities (DOTMLPF) improvements and efficiencies. This Project also uses Soldier assessments to iteratively improve the performance, optimize, and integrate technologies to augment Soldier function (e.g. shoot, move, perceive, decide, and communicate) during missions for maximizing performance. This Project supports the Measuring and Advancing Soldier Tactical Readiness and Effectiveness (MASTR-E) Science and Technology program supported by the Office of the Secretary of Defense Close Combat Lethality Task Force.

This Project is fully coordinated and complementary with the other PE/Projects in support of MASTR-E to include the following: PE 0602143A (Soldier Lethality Technology) / Projects BC6 (Human Perf-Tech for Warfighter Enhancement), BC2 (Next Gen Mobility & Lethality Tech for Warfighters), and BB9 (Human Performance Tech for Mobility & Lethality). This work is also supported by and fully coordinated with efforts conducted by Medical Research & Development Command (MRDC), Army Research Institute (ARI), U.S. Military Academy (USMA), and other academic and industry partners. This work is in partnership with Forces Command (FORSCOM) operational units and the appropriate Training and Doctrine Command (TRADOC) organizations as well as established transition partners, including Army Test and Evaluation Command (ATEC) & Program Executive Office- Soldier (PEO-S). This project also complements and is fully coordinated with work performed across Army, Navy, and Air Force under the Reliance 21 Human Systems Community of Interest: Systems Interfaces & Cognitive Processes and Protection, Sustainment, and Warfighter Performance.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas, the Close Combat Lethality Task Force, the Army Modernization Strategy and supports the Soldier Lethality Cross Function Team (CFT) efforts.

Work in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Soldier/Squad Performance Metrics for Lethality	4.633	4.325	4.658
Description: This effort validates and matures technologies, methodologies, and human performance models to demonstrate increased Soldier and Small Unit mobility & lethality to achieve overmatch. The effort validates and integrates human performance			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*	**Project (Number/Name)** BC1 / *Human Performance AdvTech for Mobility & Lethality*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
sensors, models, and design guidance into training/education, test and evaluation, and materiel. The results of this work will allow the Army to develop equipment, systems and training devices that maximize the close combat Soldier and small unit performance in multi-domain operations. ***FY 2021 Plans:*** Mature technologies, methodologies, and human performance models for demonstrating increased mobility and lethality of the individual and small unit to achieve overmatch; optimize and integrate human performance assessment methods and algorithms into training techniques, test and evaluation methodologies, and materiel solution options to provide analyses and performance impacts between materiel and non-materiel solutions to maximize performance of the individual Warfighter and small unit; demonstrate methods and algorithms that have the potential to improve system design and efficiencies. ***FY 2022 Plans:*** Will demonstrate an instrumented test bed (squad Situational Training Exercise lane and Shoot House) for the evaluation of Soldier and small unit mobility and lethality; utilizing the test bed, demonstrate the linkages between individual technical performance measures, measures of performance, and squad measures of effectiveness under controlled conditions to optimize repeatability and reliability; train and validate predictive performance algorithms in relevant environments; demonstrate down-selected machine learning performance algorithms developed in PE 0602143A (Soldier Lethality Technology) in multidimensional human performance datasets (such as the 72-hr mission field study). ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort.			
Title: Operational Unit Partnership and Soldier Touch Point ***Description:*** This effort optimizes innovation through Science and Technology touch points with the Operational force, resulting in rapid iteration, concept maturation, integration, validation of laboratory findings, and transition of technologies and methodologies in response to operational unit demand signal. This effort streamlines demonstration, data collection, and technology maturation for near termDOTMLPF solutions, enabling faster delivery of materiel and non-materiel products/knowledge refined with direct Soldier input. This body of work allows validated, empirical, assessment of any equipment capability or training intervention as part of the Soldier architecture to inform future acquisition investments, training, and operational trade space decisions. ***FY 2021 Plans:*** Down-select relevant Soldier and squad predictors of tactical performance (e.g. shoot, move, decide); continue to conduct and analyze large scale field studies and data sets from units performing mission essential tasks in realistic, constructive tactical environments; employ a cross-assessment of variables such as equipment use and configuration, situational awareness tools,	-	7.055	9.345

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*	**Project (Number/Name)** BC1 / *Human Performance AdvTech for Mobility & Lethality*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
sleep levels, nutritional intake, human augmentation assists, etc. to inform training and materiel solutions designed to maximize tactical performance to overcome Soldier limitations and achieve overmatch. ***FY 2022 Plans:*** Will conduct small and large scale field studies to fully mature dataset to train and validate human performance algorithms and analyze findings and data sets from expert and novice units performing mission essential tasks in realistic, constructive tactical environments; provide and advance a front end solution to access and visualize database elements; demonstrate human performance data visualization tools to increase situational awareness and improve decision making. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funding realigned from PE 0603118A (Soldier Lethality Advanced Technology) / BB8 (Soldier Centric Advanced Technology). Funding increase in FY22 will enable additional experimentation in relevant environments, validating algorithms generated in the lab in relevant environments.			
Accomplishments/Planned Programs Subtotals	4.633	11.380	14.003

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / *Soldier Lethality Advanced Technology*	Project (Number/Name) BC4 / *Soldier Decision Making&Comms Performance AdvTech*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
BC4: *Soldier Decision Making&Comms Performance AdvTech*	-	1.918	1.925	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Fiscal Year 2022 Administratively moving to the Future Vertical Lift (FVL) portfolio:
PE 0603465A (Future Vertical Lift Advanced Technology)
* Project AL9 (Holistic Sit Awareness and Dec Making Adv Tech)

A. Mission Description and Budget Item Justification

This Project integrates research, theory and applied operations to maximize effectiveness of Soldiers and their equipment. Efforts in this Project support early application of Human Systems Integration (HSI) during Advanced Technology Development by translating research findings into performance-based prototype subsystem, component, and software interface design criteria for use in the Army's requirements definition process and materiel acquisition process for Army Modernization. Application of this work will yield reduced workload, fewer errors, reduced task times, enhanced Soldier protection, user acceptance, and allow the Soldier to extract maximum performance from the equipment. Representative major efforts address Soldier cognitive load and cognitive fusion research, advanced aircraft design to include flight in degraded visual environments, and development of human performance measures and methods to address current and future human system integration challenges. Individual efforts exploit adaptive learning methods and strategies, applied methods to accelerate expertise development, integration of displays for ease of use and optimized situational awareness, and development of technical frameworks for crew automation integration in Command and Control Systems (C2). Efforts also support flight crew decision-aiding and autonomy, advanced crew station design for aircraft, full mission operations in degraded visual environments, and advanced manned-unmanned teaming concepts.

Results of these efforts are transitioned to the Program Executive Offices (PEO), Army Training and Doctrine Command (TRADOC), Human Systems Integration (HSI) Directorate (Army G1), and the Army Test and Evaluation Command (ATEC). This Project complements work done in PE 0602143A (Soldier Lethality Technology) / Project BC3 (Soldier Decision Making & Communications Performance Technology).

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

Work in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Human System Integration Demonstration	1.918	1.925	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*	**Project (Number/Name)** BC4 / *Soldier Decision Making&Comms Performance AdvTech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Description: This effort provides early front end analysis and assessment for HSI in Army systems acquisition to influence Advanced Technology Development and prototype design specifications. Research findings translate into performance-based design specifications and human performance analyses for use in the Army's requirements definition process, training development, and materiel acquisition process. Results of these efforts provide quantified, data-driven analysis on the value of applying HSI early in Army technology development and systems acquisition and are transitioned to technology developers, evaluators, and other Advanced Technology Development stakeholders to include the Future Vertical Lift and Air Missile Defense Program Offices, TRADOC, and the ATEC. ***FY 2021 Plans:*** Demonstrate effects of augmented pilot displays on Soldier performance and system effectiveness by conducting human performance and human-system interface analyses on Pilot Degraded Visual Environment Cueing simulations and data collected during Advanced Technology Development flight trials; provide early (Advanced Technology Demonstration) assessment of HSI considerations for advanced crew station technology design and autonomy/crew task automation, thereby reducing life-cycle costs; optimize HSI designs of highest priority Army technologies and systems including advanced crew station technology design and autonomy/crew task automation for enhanced Soldier performance and system effectiveness. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** In FY 2022, this effort is administratively realigned to the Future Vertical Lift (FVL) portfolio into Program Element 0603465A Project AL9; no change in scope of work.			
Accomplishments/Planned Programs Subtotals	1.918	1.925	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / *Soldier Lethality Advanced Technology*	Project (Number/Name) BC8 / *Training Advanced Technology (Other than STE)*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
BC8: *Training Advanced Technology (Other than STE)*	-	1.280	4.307	2.993	-	2.993	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates advanced live training technologies in support of the Army's need for live simulations that accurately replicate and realistically represent the effects of current and future weapons systems during force-on-force and force-on-target training. Integration of the Live/Mixed reality into a single synthetic training environment will modernize the current Live Training Environment and allow fair fight engagements across all training environments and training devices.

This effort complements work done in 0602143A (Soldier Lethality Technology) / Project BC7 (Training Technology (Other than Synthetic Training Environment (STE)).

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

Work in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Live Training Technology Applications ***Description:*** This effort investigates technology to enhance the fidelity of live training systems and develops future live training capabilities for conducting force-on-force, combined arms exercises to enhance readiness at Army home stations and Combat Training Centers.	1.280	-	-
Title: STE: Live Training Applications ***Description:*** This effort exploits technology to demonstrate enhanced fidelity of live training systems and develops future live training capabilities for conducting force-on-force, combined arms exercises to enhance readiness at Army home stations and Combat Training Centers. ***FY 2021 Plans:*** Demonstrate software applications and procedures to measure and calibrate eBullet telemetry data; mature prototype devices to demonstrate the geo-pairing capabilities of the eBullet; and optimize the accuracy of the Weapon Orientation Module device to improve measurements of weapon azimuth, elevation, and cant at low power and cost. ***FY 2022 Plans:***	-	4.307	2.993

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*	**Project (Number/Name)** BC8 / *Training Advanced Technology (Other than STE)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Will mature and demonstrate software algorithms that calculate weapon orientation or position for direct or indirect fire weapons based on a number of different sensor inputs (e.g. inertial, computer vision, LIDAR); improve the size, weight, and power consumption of the Weapon Orientation Module; demonstrate a matured position tracking capability suitable for crew served indirect fire weapons. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funding change reflects minor changes to scope of the effort.			
Accomplishments/Planned Programs Subtotals	1.280	4.307	2.993

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / *Soldier Lethality Advanced Technology*	Project (Number/Name) BC9 / *Adv Soldier Sensors/Displays AdvTech for Dismounts*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
BC9: *Adv Soldier Sensors/ Displays AdvTech for Dismounts*	-	13.097	10.792	13.163	-	13.163	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures, optimizes, and demonstrates fully digital sensor systems, architectures, and interfacing capabilities to fuse sensors, and network situational understanding information and targeting capabilities to enable maintained mounted and dismounted visual advantage, increased situational awareness, decreased fratricide, and decreased response times to all threats in all environments. Work in this Project supports the Army Science and Technology Soldier Lethality, Next Generation Combat Vehicle, and Future Vertical Lift Army Modernization priorities.

This effort complements work done in PE 0602143A (Soldier Lethality Technology) / BD1 (Advanced Soldier Sensors/Displays Tech for Dismounts).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas, the Army Modernization Strategy, and supports the Soldier Lethality Cross Functional Team (CFT).

Work in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Advanced Soldier Sensors/Displays Advanced Technology for Dismounts	13.097	10.792	13.163
Description: This effort will mature and demonstrate low cost Soldier-borne situational understanding systems with greater fidelity for improved maneuver and lethality, as well as integrates automated target cueing to increase probability of recognition/ identification and tracking of threats in all environments.			
FY 2021 Plans: Optimize augmented reality (AR) capabilities for mounted and dismounted Soldiers; mature AR enabled common operating picture (COP) technologies to provide shared situational understanding between mounted and dismounted Soldiers; exploit existing aided target recognition (AiTR) algorithms to reduce Soldier target acquisition timelines; mature multi-source data fusion and autonomous threat detection capabilities; mature approaches for overlays and displays of 3D point cloud information; finalize requirement allocations for user platforms to achieve AR capability and provide suggested architecture for platforms to support.			
FY 2022 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*	**Project (Number/Name)** BC9 / *Adv Soldier Sensors/Displays AdvTech for Dismounts*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Will improve performance of augmented reality (AR) systems for mounted/mechanized infantry interactions by providing heading corrections and providing self-location to infantry within a combat vehicle; mature sensor systems and integrate with command and control systems for information sharing capabilities between dismounted and mounted Soldiers on a tactical vehicle platform; mature novel sensor payloads with enhanced processing to improve detection, localization and notification capabilities required for improved situational awareness against all threats; optimize performance of sensors to enable effective range of threats, and framerates required for dismounted hostile fire detection; mature opto-acoustic techniques to enable dismounted multi-modal hostile fire detection. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase represents resources to continue maturation of novel sensors needed for dismounted detection of all threats in all environments to include urban areas.			
Accomplishments/Planned Programs Subtotals	13.097	10.792	13.163

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / *Soldier Lethality Advanced Technology*	Project (Number/Name) BD7 / *Soldier Sys Interfaces/Integration-Sensor AdvTech*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
BD7: *Soldier Sys Interfaces/ Integration-Sensor AdvTech*	-	9.273	8.741	8.374	-	8.374	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project will integrate technologies for sensing, processing, displaying information, interfacing with users, and cognitive improvement to enhance Soldier & Small Unit situational awareness & understanding. This effort will integrate battlefield and body worn sensors and data fusion algorithms to provide the dismounted Small Unit leader with clear, actionable information for making well informed, rapid, tactical decisions. This effort will mature and integrate advanced dismounted Soldier robotic and autonomous systems technologies to demonstrate autonomous navigation, manned-unmanned teaming, and networked reconnaissance to improve Soldier lethality, situational awareness, and survivability during tactical operations.

Work in this Project complements several PEs and Projects to include PE 0602143A (Soldier Lethality Technology) / BD6 (Soldier Sys Interfaces/Integration - Sensor Technology), BB9 (Human Performance Tech for Mobility & Lethality), and PE 0603118A (Soldier Lethality Advanced Technology) / BC9 (Adv Soldier Sensors/Displays AdvTech for Dismounts).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas, the Army Modernization Strategy, and the Soldier Lethality Cross Functional Team (CFT).

Work in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Soldier System Interfaces & Integration (Sensor Advanced Technology)	9.273	8.741	8.374
Description: This effort will integrate battlefield and body-worn sensors and mature data fusion algorithms to provide the dismounted Small Unit leader with clear, actionable information to make well informed, rapid, tactical decisions. This effort will mature and integrate advanced dismounted Soldier robotic and autonomous systems technologies to demonstrate autonomous navigation, manned-unmanned teaming, and networked reconnaissance to improve Soldier lethality, situational awareness, and survivability during tactical operations.			
FY 2021 Plans: Continues to integrate battlefield and Soldier worn sensors with body area networks and the Nett Warrior architecture; matures and integrates advanced algorithms and user interfaces for Small Unit mission planning, human performance sensing, Soldier worn equipment sensing, and remote sensing; conducts field demonstrations of integrated battlefield and Soldier worn sensor			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*	**Project (Number/Name)** BD7 / *Soldier Sys Interfaces/Integration-Sensor AdvTech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
systems to validate performance and operation; matures algorithms, user interfaces, and architectures to enable autonomous tactical SUAS and conduct field demonstrations to validate the performance and operation of the system; integrates SUAS with the Integrated Visual Augmentation System (IVAS) and Nett Warrior to enable sharing of networked tactical data between small units for increased Soldier lethality. ***FY 2022 Plans:*** Will mature and integrate Small Unit leader planning and decision tools, human performance algorithms and visualization tools, and Soldier equipment sensing algorithms and user interfaces; conduct field demonstrations of integrated Soldier sensor systems with Nett Warrior and the Integrated Visual Augmentation System (IVAS) in relevant field environments to validate performance and operation; demonstrate advanced autonomous tactical Small Unmanned Aerial Systems (SUAS) capabilities (ie. collision avoidance, fast flight, nighttime navigation, target detection) on representative military platforms in relevant field environments to validate the performance and operation of the technologies; mature technologies to enable hasty resupply of consumable items found in an infantry squad basic load for the Multi Domain Operations (MDO) battlespace. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funding decrease reflects minor planned change in project scope for this effort.			
Accomplishments/Planned Programs Subtotals	9.273	8.741	8.374

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / *Soldier Lethality Advanced Technology*	Project (Number/Name) BD9 / *Soldier & Sm Unit Tactical Energy AdvTech*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
BD9: *Soldier & Sm Unit Tactical Energy AdvTech*	-	2.973	3.141	3.184	-	3.184	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project will demonstrate advanced Power and Energy (P&E) technologies for the dismounted Soldier to lighten equipment load, reduce resupply need, and enhance mobility. This Proj will conduct Soldier and Small Unit power and energy technology maturation, integration with clothing and individual equipment, technical analysis, and operational assessment.

Work in this Project complements several PEs to include PE 0602143A (Soldier Lethality Technology) / BD6 (Soldier Sys Interfaces/Integration - Sensor Tech), BB9 (Human Performance Tech for Mobility & Lethality), BD8 (Soldier & Sm Unit Tactical Energy Tech), and PE 0603118A (Soldier Lethality Advanced Technology) / BC9 (Adv Soldier Sensors/Displays AdvTech for Dismounts).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas, the Army Modernization Strategy, and the Soldier Lethality Cross Functional Team (CFT).

Work in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Dismounted Soldier Power and Energy	2.973	3.141	3.184
Description: This effort matures, integrates, and demonstrates advanced Soldier Power and Energy (P&E) technologies that are used to power the dismounted Soldier and small unit's command and control, communications, computers, and sensor devices during tactical operations. This work will result in the Army being able to provide the power and energy the future Soldier requires to operate effectively, while doing so at a reduced physical burden.			
FY 2021 Plans: Mature, integrate, and demonstrate technologies for increasing the run-time of rechargeable battery technologies, specifically Si-Anode based rechargeable batteries configured to centrally power Soldier electronic systems, to reduce the weight and physical burden on Soldiers; conduct field demonstrations to validate battery operation; integrate efficient Soldier power generation technologies such as advanced fuel cell systems with Soldier tactical electronic systems and conduct field demonstrations to characterize system performance and validate operational capabilities.			
FY 2022 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*	**Project (Number/Name)** BD9 / *Soldier & Sm Unit Tactical Energy AdvTech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Will mature, integrate, and demonstrate technologies for increasing the run-time of rechargeable battery technologies for the Soldier?s weapon, body, or helmet electronics; conduct field demonstrations to validate the performance and operation of batteries to support operational Soldier materiel; mature, integrate, and demonstrate novel power management technologies for transferring power efficiently between electronic components resident on the Soldier?s head, body, or weapon; mature and demonstrate Soldier power generation technologies for recharging batteries during a Platoon Level dismounted mission. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort.			
Accomplishments/Planned Programs Subtotals	2.973	3.141	3.184

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / *Soldier Lethality Advanced Technology*	Project (Number/Name) BE2 / *Joint Service Combat Feeding Advanced Technology*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
BE2: *Joint Service Combat Feeding Advanced Technology*	-	1.709	2.367	2.424	-	2.424	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates combat ration and field feeding technologies to optimize Warfighter performance, decrease the risk of exposure to chemical and biological contaminants in foods, and reduce the logistics burden to enable semi-independent operations. The Army serves as the Executive Agent for this Department of Defense (DoD) program, with oversight and coordination provided by the DoD Combat Feeding Research and Engineering Board.

This Project matures and demonstrates work done in PE 0602143A (Soldier Lethality Technology) / Project BE3 (Joint Service Combat Feeding Technology).

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

Work in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Joint Service Combat Feeding Advanced Technology Demonstration	1.709	2.367	2.424
Description: This effort matures and demonstrates combat ration and field feeding technologies to optimize Warfighter performance, decrease risk of exposure to chemical and biological contaminants in foods, and reduce the logistics burden to enable semi-independent operations.			
FY 2021 Plans: Demonstrate multispectral imaging of ration components for identifying potential biological contamination; optimize rapid identification of food pathogen viability to provide real-time food safety information to commanders; validate chemical agent permeability in ration packaging in support of Chemical Biological Radiological Nuclear (CBRN) threats; validate nutrient stability in Close Combat Assault Ration components to ensure nutrient retention during processing and prolonged storage; and continue maturing and demonstrating nutrient densification technologies and alternative packaging configurations to reduce weight/logistics burden and enable semi-independent operations.			
FY 2022 Plans: Will validate critical limits for multispectral imaging to identify potential quality degradation of ration components; optimize field-deployable biosensor detection platforms for multiple pathogens in food matrices to reduce risk of food-borne illness on the battlefield; demonstrate baseline Close Combat Assault Ration effect on Warfighter physical performance to enable semi-			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*	**Project (Number/Name)** BE2 / *Joint Service Combat Feeding Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
independent operations; validate decontamination agent performance on ration packaging in support of Chemical Biological Radiological Nuclear (CBRN) threats; validate effects of cycling temperatures and processing methods on nutrient compounds in ration components to ensure nutrient retention during processing and prolonged storage; validate small scale atmospheric water harvester performance to decrease logistical burdens in multi-domain operations; and validate conductive materials performance during heating and sterilization processing methods to enhance ration heating efficiency. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort			
Accomplishments/Planned Programs Subtotals	1.709	2.367	2.424

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / *Soldier Lethality Advanced Technology*	Project (Number/Name) BE5 / *Personnel & Airdrop Safety Advanced Technology*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
BE5: *Personnel & Airdrop Safety Advanced Technology*	-	6.491	6.076	6.879	-	6.879	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates equipment and innovative techniques for precision aerial delivery of cargo and personnel. Technologies support Army Modernization Priority, Soldier Lethality. Aerial delivery is a key capability for rapid force projection and global precision delivery to support the mission readiness profile for Global Response Force (GRF). These efforts are designed to advance state of the art precision delivery technologies such as parachutes; guidance, navigation, and control (GNC) components and subsystems; tracking sensors; software algorithms; and safety rigging that integrates with currently equipped aircraft, unmanned aerial systems (UAS), and advanced rotary wing aircraft. These efforts provide the Warfighter with highly accurate, timely cargo/payload delivery and resupply in all terrain and weather conditions. Precision delivery/resupply reduces vulnerability of ground Soldiers, aircraft, and aircrew. Precision aerial delivery supports remote warfare with activities such as placement of battlefield sensors and reduction of Soldier load.

This Project complements work done in the Science & Technology Precision, Navigation and Timing Modernization priority.

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

Work in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Personnel & Airdrop Safety Advanced Technology	6.491	6.076	6.879
Description: This effort matures and demonstrates parachute materials and designs, precision guidance and navigation software and hardware, tracking sensors, and safety devices to increase the accuracy of delivering cargo to remote locations and/or complex terrains in global positioning system (GPS) denied environments. This effort also provides technologies that increase safety during personnel insertions into theaters of operation. This effort supports capability demonstrations for mitigating the Army' s challenge of overburdened Soldiers through the use of tactical aerial resupply technologies, as well as supporting Anti-Access/Area Denial (A2/ AD) and manned-unmanned teaming (MUM-T) operational concepts by demonstrating airdrop from non-traditional platforms.			
FY 2021 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*	**Project (Number/Name)** BE5 / *Personnel & Airdrop Safety Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Demonstrate novel parachute control methods in all phases of flight and for application across a broad range of airdrop systems to introduce advantageous changes in fundamental flight performance and to support precision guidance of parachutes in complex, non-traditional airdrop environments. ***FY 2022 Plans:*** Will optimize heavy equipment airdrop system performance to minimize altitude loss and increase system reliability. Will demonstrate capabilities to airdrop up to at least 50,000 lbs through live airdrop testing from a C-17 aircraft. Will demonstrate advancements in high altitude insertion technology that facilitate extended offset insertions in GPS denied conditions. Will mature Next Generation Static Line parachute systems and demonstrate effectiveness in Immediate Response Force (IRF) mission. Will optimize the design of an autonomously guided powered aerial resupply system with a minimum of tenfold increase in horizontal standoff capability compared to conventional guided airdrop systems. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funding increase in FY22 supports increased live airdrop testing of at least 50,000 lbs. from a C-17, and demonstrations of a tenfold horizontal standoff capability and extended offset in GPS denied conditions in a MDO environment.			
Accomplishments/Planned Programs Subtotals	6.491	6.076	6.879

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / *Soldier Lethality Advanced Technology*	Project (Number/Name) BE9 / *STE Advanced Technology*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
BE9: *STE Advanced Technology*	-	21.581	12.790	13.401	-	13.401	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates technologies supporting the Army's Synthetic Training Environment (STE). The Synthetic Training Environment (STE) is the next generation holistic collective training capability that will train units where they will fight, with whom they will fight with, and in complex operational environments to include dense urban and sub-terrain; within the entire range of combined arms maneuver tasks in support of Multi- Domain Operations. STE Information Systems (STE-IS) delivers the Common Synthetic Environment consisting of Global Terrain/One World Terrain (OWT), Training Simulation Software (TSS), and Training Management Tools (TMT). The STE will be available where training occurs (home station, combat training centers, armories, institutions, shipboard, deployed) and will include Air and Ground Reconfigurable Virtual Collective Trainers (RVCTs), a Soldier/Squad Virtual Training (S/SVT), and a live training capability. The STE will be cloud-enabled, compatible with the Army Enterprise Network, and service-based through the Common Operating Environment, including Live and Constructive. The STE will provide the realistic repetitions necessary to fight 25 bloodless battles before the first battle; a Secretary of Defense priority.

This Project complements work done in PE 0602143A (Soldier Lethality Technology) / Project BE8 (Synthetic Training Environment (STE) Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas, the Army Modernization Strategy, and supports the STE Cross Functional Team efforts.

Work in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: STE Soldier/Squad Virtual Trainer ***Description:*** This effort matures and demonstrates a common battle drill squad-level mixed reality based system that allows for the rapid conduct and repetition of Squad-level training. The training system will make it possible to conduct diverse, repeatable and effective training without extensive training infrastructure. This effort also matures and demonstrates novel and realistic training environments that provide increased levels of proficiency and readiness through immersive training scenarios conducted at the point of need.	5.887	-	-
Title: STE Training Management Tool ***Description:*** This effort matures and demonstrates STE-relevant tools and technologies that automatically adapt training to the learner's skill level, conduct intelligent after action reviews, automate team training assessments, and enable the visualization of and interaction with a Mixed Reality Common Operating Picture of the battlespace.	1.118	3.371	3.300

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*	**Project (Number/Name)** BE9 / *STE Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
FY 2021 Plans: Validate prototypes and methods for conducting automated team assessments during STE-relevant use-cases; demonstrate artificial intelligence (AI) methods to support self-optimizing systems that produce skill retention and transfer into the operational environment; demonstrate human factors elements for information visualization, multimodal interaction, and human performance assessment using a distributed interactive visualization architecture enabling real-time collaborative mission planning, rehearsal, command and control, training, and after action review. ***FY 2022 Plans:*** Will exploit the association between squad level performance measures for individuals and teams and optimize how to best provide instructors with data to assess their performance and readiness; mature generalized intelligent tutoring framework allowing for both individual and team tutoring capabilities within synthetic training environments; demonstrate a team competency tracking capability that utilizes Dept. of Defense learning architecture standards; validate battlespace visualization tools to support large-scale simulations with synthetic training environments and mission command decision making. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort.			
Title: STE One World Terrain	5.702	2.816	2.904
Description: This effort matures and demonstrates tools and methods that improve the speed, fidelity and delivery of synthetic terrain and environmental data needed to support mission rehearsal and training in a representation of the globe, fully accessible through the Army network and usable by all simulation trainers. This effort also matures and develops complex representations (including megacities and subterranean) of the operational environment and the Multi-Domain battlefield in synthetic training environments. ***FY 2021 Plans:*** Demonstrate tools that rapidly and automatically process terrain source data into a single representation; mature tools to support conducting uninterrupted training in sub-surface, surface, and infrastructure within dense urban environments including: automated underground geometry and feature generation, representation of key civilian infrastructure components via scenario generation tools, representation of complex road networks and controls, and enabling rich attribution of hydrological features and complex structures. ***FY 2022 Plans:*** Will demonstrate processes, tools and software for surface level feature classification and extraction for material and terrain artifacts to support One World Terrain (OWT) application spaces for the resulting modernized 3D terrain products; improve attribution deficiencies for OWT; demonstrate runtime implementation optimizations to rapidly assemble tailored terrain datasets			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*	**Project (Number/Name)** BE9 / *STE Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
suitable for application-specific needs; improve methods to procedurally correct or validate 3D terrain data; optimize the OWT data model specification to support traditional and non-traditional application domains ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort.			
Title: STE Training Simulation Software ***Description:*** This effort matures and demonstrates technologies that support Multi-Domain Operations modeling and simulation configuration and scalability technologies for collective training. In addition, matures and demonstrates technologies that allow the synthesis of robust military behaviors that enable the scaling of Synthetic Training Environment (STE) collective training configurations and delivery to the Point of Need through the exploitation of emerging computing and networking technologies that optimize computing architectures for integrating components (models, behaviors, data, etc.) of the Training Simulation Software (TSS). ***FY 2021 Plans:*** Demonstrate enabling computing and networking technologies to deliver a complex synthetic operational environment to the point of need; validate architecture strategies for integrating components (models, behaviors, data, etc.) of the Training Simulation Software (TSS) to enable reusability, extensibility, reliability and maintainability; validate models and data representing critical aspects of the operational environment integrated in to the STE TSS in support of collective training use cases; demonstrate synthetic representations of Multi-Domain Operations to include patterns of life and cyber effects; improve the realism of military behaviors representing critical aspects of the operational environment using novel AI techniques. ***FY 2022 Plans:*** Will mature and demonstrate the integration of simulation architecture technologies that allow for components (models, behaviors, data, etc.) to be dynamically integrated to support collective training use cases; will demonstrate technologies to generate STE-ready behavior models from authoritative sources to facilitate reuse and reduce the cost of TSS development; will improve Operational Environment (OE) models in support of emerging TSS gaps from collective training use cases; will demonstrate emerging AI techniques to represent military behaviors against OE modeling needs. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funding increased to further research into AI techniques in support of developing OE models for MDO training.	8.874	5.752	7.197
Title: Weapons Effects for STE ***Description:*** This effort matures and demonstrates structural weapon effects and projectile penetration models and algorithms to integrate within the Army?s STE. This effort provides One World Terrain with accurate representation of the effects of threat	-	0.851	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*	**Project (Number/Name)** BE9 / *STE Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
weapons (such as small arms, projectiles, indirect fire, and improvised explosives device attacks) and display of realistic vulnerabilities in the battlespace. ***FY 2021 Plans:*** Improve performance of enhanced algorithms for predicting blast effects from various weapons and explosive events to include predicting structural damage in complex terrain; mature and provide improved algorithms for predicting large projectile fragmentation and penetration effects on critical assets. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** This task ends in FY21			
Accomplishments/Planned Programs Subtotals	21.581	12.790	13.401

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / *Soldier Lethality Advanced Technology*	Project (Number/Name) BS8 / *Soldier Lethality Advanced Technology*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
BS8: *Soldier Lethality Advanced Technology*	-	17.500	45.200	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Congressional Interest Item funding provided for Soldier Lethality Advanced Technology.

A. Mission Description and Budget Item Justification

Congressional Interest Item funding provided for Soldier Lethality Advanced Technology.

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

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021
Congressional Add: Subterranean Warfighter Advanced Technology ***FY 2020 Accomplishments:*** Program Increase supported advanced research on Subterranean Warfighter Advanced Technology. Work executed under the direction of the Army Futures Command.	1.500	-
Congressional Add: Rapid Safe Advanced Materials ***FY 2020 Accomplishments:*** Program Increase supported advanced research on Rapid Safe Advanced Materials. Work executed under the direction of the Army Futures Command.	6.000	-
Congressional Add: Multi-Spectral Sensor Mitigation ***FY 2020 Accomplishments:*** Program Increase supported advanced research on Multi-Spectral Sensor Mitigation. Work executed under the direction of the Army Futures Command.	5.000	-
Congressional Add: Helmet Pad Suspension Systems	5.000	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*	**Project (Number/Name)** BS8 / *Soldier Lethality Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021
FY 2020 Accomplishments: Program Increase supported advanced research on Helmet Pad Suspension Systems. Work executed under the direction of the Army Futures Command.		
Congressional Add: Program increase - advanced AI/AA analytics for modernization and readiness ***FY 2021 Plans:*** Conduct advanced research in Advanced AI/AA Analytics for Modernization and Readiness. Work executed by Army Futures Command.	-	10.000
Congressional Add: Program increase - small arms fire control advanced technology ***FY 2021 Plans:*** Conduct advanced research in Small Arms Fire Control Advanced Technology. Work executed by Army Futures Command.	-	8.000
Congressional Add: Program increase: Advanced technology for maneuver support and protection ***FY 2021 Plans:*** Conduct advanced research in Maneuver Support and Protection. Work executed by Army Futures Command.	-	10.000
Congressional Add: Program increase - military engineering technology for infield waste ***FY 2021 Plans:*** Conduct advanced research in Military Engineering Technology for Infield Waste. Work executed by Army Futures Command.	-	2.000
Congressional Add: Program increase - flexible LED lighting for tents and shelters ***FY 2021 Plans:*** Conduct advanced research in Flexible LED Lighting for Tents and Shelters. Work executed by Army Futures Command.	-	5.200
Congressional Add: Program increase ***FY 2021 Plans:*** Conduct advanced research in Soldier Lethality Advanced Technology. Work executed by Army Futures Command.	-	10.000
Congressional Adds Subtotals	17.500	45.200

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603118A / *Soldier Lethality Advanced Technology*	**Project (Number/Name)** BS8 / *Soldier Lethality Advanced Technology*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A