Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Army											Date: March 2024	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 2: *Applied Research*					R-1 Program Element (Number/Name) PE 0602143A / *Soldier Lethality Technology*							
COST ($ in Millions)	**Prior Years**	**FY 2023**	**FY 2024**	**FY 2025 Base**	**FY 2025 OCO**	**FY 2025 Total**	**FY 2026**	**FY 2027**	**FY 2028**	**FY 2029**	**Cost To Complete**	**Total Cost**
Total Program Element	-	266.501	104.470	102.236	-	102.236	104.027	104.357	105.930	106.681	0.000	894.202
AY6: *Soldier Squad Small Arms Armaments Technology*	-	10.962	10.143	10.343	-	10.343	10.442	10.448	10.622	10.728	0.000	73.688
AY8: *Small Arms Fire Control Technology*	-	2.091	-	-	-	-	-	-	-	-	0.000	2.091
AZ2: *Body Armor & Integrated Headborne Technology*	-	6.617	6.321	5.807	-	5.807	5.814	5.817	5.881	5.941	0.000	42.198
AZ5: *Soldier Protection Technology - Vulnerability*	-	10.734	11.370	11.397	-	11.397	11.409	11.416	11.540	11.656	0.000	79.522
AZ9: *Soldier Protection Advanced Tech - Detectability*	-	1.747	-	-	-	-	-	-	-	-	0.000	1.747
BB4: *Dismounted Soldier Survivability Materials*	-	2.948	4.985	5.267	-	5.267	5.355	7.867	7.905	7.984	0.000	42.311
BB5: *Physical Augmentation: Tech for Human Interactions*	-	0.567	-	-	-	-	-	-	-	-	0.000	0.567
BC2: *Next Gen Mobility & Lethality Tech for Warfighters*	-	4.259	6.894	8.334	-	8.334	8.120	11.100	11.171	11.282	0.000	61.160
BC6: *Human Perf - Tech for Warfighter Enhancement*	-	1.348	-	-	-	-	-	-	-	-	0.000	1.348
BC7: *Training Technology (Other than STE)*	-	24.354	33.822	29.446	-	29.446	26.831	21.505	21.748	21.966	0.000	179.672
BD1: *Adv Soldier Sensors/ Displays Tech for Dismounts*	-	15.939	16.557	16.598	-	16.598	16.609	16.619	16.802	16.970	0.000	116.094
BD6: *Soldier Sys Interfaces/ Integration- Sensor Tech*	-	0.237	0.301	0.401	-	0.401	0.802	0.802	0.902	0.601	0.000	4.046
BD8: *Soldier & Sm Unit Tactical Energy Tech*	-	6.291	6.911	7.465	-	7.465	10.575	10.058	10.540	10.646	0.000	62.486
BE3: *Joint Service Combat Feeding Technology*	-	4.627	4.074	4.081	-	4.081	4.328	4.980	5.034	5.084	0.000	32.208

Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Army										Date: March 2024		
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 2: *Applied Research*					R-1 Program Element (Number/Name) PE 0602143A / *Soldier Lethality Technology*							
BE8: *Synthetic Training Environment (STE) Technology*	-	5.743	-	-	-	-	-	-	-	-	0.000	5.743
BP9: *Soldier Lethality Technologies (CA)*	-	164.700	-	-	-	-	-	-	-	-	0.000	164.700
BR9: *Personnel & Airdrop Safety Technology*	-	3.337	3.092	3.097	-	3.097	3.742	3.745	3.785	3.823	0.000	24.621

Note

Project BD6 has realignments from Soldier System Interfaces & Integration (Sensor Technology) within this project and from task PE 0603118A (Soldier Lethality Advanced Technology) / Project BD7 (Soldier Sys Interfaces Integration-Sensor Advanced Technology).

A. Mission Description and Budget Item Justification

This Program Element (PE) conducts fundamental research on Soldier Lethality technologies to develop an integrated Soldier and Squad architecture of equipment and systems that improve Soldier and Small Combat Unit survivability, sustainability, mobility, combat effectiveness, and individual cognitive and physical readiness. To address the challenges of integrating multiple technologies and sub-systems, research conducted in this PE, significant Science and Technology applied research investments in all areas of Soldier Lethality focuses on how to improve the effectiveness of the technologies a Soldier utilizes and apply systems-level practices to mitigate constraints from size and weight of the equipment. Research areas encompass individual and crew-served weapon designs and technologies as well as applied research in lightweight and transparent armor materials to mitigate effects from blast and ballistic threats, counter explosive hazard detection, counter-sensor capabilities, and signature management of weapons, equipment, personnel and high value targets. This PE investigates, develops and designs materials, technologies, methodologies and system models required to experiment and optimize Soldier lethality and survivability through investments in mobility, human-agent teaming, and improved situational awareness interfaces and display technologies as well as to provide Soldier-borne power and energy materials and components that support multiple Soldier-borne systems. This PE also investigates Warfighter training technologies and develops the underpinning technologies to establish architecture standards and interfaces necessary for creating realistic synthetic environments to create a single, interconnected synthetic training system to enable Army units and leaders to conduct realistic multi-echelon / multi-domain combined arms maneuver and mission command training, increasing proficiency through repetition. Human Factors Engineering projects conduct applied research to design weapon systems standards, guidelines, handbooks, and Soldier training curriculum and tools.

Results of these efforts are transitioned within the Army Futures Command, the Program Executive Offices, Army Training and Doctrine Command (TRADOC), Army Medical Command (MEDCOM), and the Army Test and Evaluation Command (ATEC).

Work in this PE complements PE 0603118A (Soldier Lethality Advanced Technology).

Portions of this funding line support the Soldier Lethality Army Modernization Priority.

Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Army	Date: March 2024
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 2: *Applied Research*	**R-1 Program Element (Number/Name)** PE 0602143A / *Soldier Lethality Technology*

B. Program Change Summary ($ in Millions)	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
Previous President's Budget	253.539	104.470	108.668	-	108.668
Current President's Budget	266.501	104.470	102.236	-	102.236
Total Adjustments	12.962	0.000	-6.432	-	-6.432
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	15.221	-			
• SBIR/STTR Transfer	-2.259	-			
• Adjustments to Budget Years	-	-	-6.432	-	-6.432

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2023	FY 2024
Project: BP9: *Soldier Lethality Technologies (CA)*		
Congressional Add: *Program increase - Pathfinder Airborne*	8.000	-
Congressional Add: *Program increase - HEROES Program*	10.000	-
Congressional Add: *Program Increase - ADVANCED TEXTILES AND SHELTERS*	6.000	-
Congressional Add: *Program Increase - Digital Night Vision Technology*	9.700	-
Congressional Add: *Program Increase - Military Footwear Research*	10.000	-
Congressional Add: *Program Increase - Nanolayered Polymer Optics*	10.000	-
Congressional Add: *Program Increase - ADVANCED BALLISTIC PROTECTION TECHNOLOGY*	25.000	-
Congressional Add: *Program Increase - ARTIFICIAL INTELLIGENCE - ENHANCED EDUCATIONAL TECHNOLOGY AND LEARNING*	5.000	-
Congressional Add: *Program Increase - ENHANCED BALLISTIC PROTECTIVE EYEWEAR*	5.000	-
Congressional Add: *Program Increase - ENHANCING SOLDIER BALLISTIC TECHNOLOGIES*	5.000	-
Congressional Add: *Program Increase - FLAT PANEL TECHNOLOGY*	2.000	-
Congressional Add: *Program Increase - FUTURE FORCE REQUIREMENTS EXPERIMENTATION*	10.000	-
Congressional Add: *Program Increase - INNOVATIVE TRAINING TECHNOLOGIES*	5.000	-
Congressional Add: *Program Increase - LITHIUM-ION BATTERY CELL RESEARCH PILOT*	9.000	-
Congressional Add: *Program Increase - PATHFINDER ADAPTIVE EXPERIMENTATION FORCE*	5.000	-

Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Army	Date: March 2024
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 2: *Applied Research*	**R-1 Program Element (Number/Name)** PE 0602143A / *Soldier Lethality Technology*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2023	FY 2024
Congressional Add: *Program Increase - PATHFINDER CYBER INITIATIVES*	12.000	-
Congressional Add: *Program Increase - REGIONAL WORKFORCE PILOT*	10.000	-
Congressional Add: *Program Increase - SOLDIER & SMALL UNIT TACTICAL ENERGY TECHNOLOGY*	3.000	-
Congressional Add: *Program Increase - Extended Range and Hybrid Gun Launched Unmanned Aerial Systems*	15.000	-
Congressional Add Subtotals for Project: BP9	164.700	-
Congressional Add Totals for all Projects	164.700	-

Change Summary Explanation

FY2025 decrease reflects limitation of new innovation proposals for the novel training applications of emergent AI methods that are for specific learning outcomes with military-relevant AI training methods that expand the utility of AI for generating educational, training, or operational-insights and recommendations.

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army			Date: March 2024
Appropriation/Budget Activity 2040 / 2	R-1 Program Element (Number/Name) PE 0602143A / *Soldier Lethality Technology*	Project (Number/Name) AY6 / *Soldier Squad Small Arms Armaments Technology*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
AY6: *Soldier Squad Small Arms Armaments Technology*	-	10.962	10.143	10.343	-	10.343	10.442	10.448	10.622	10.728	0.000	73.688

A. Mission Description and Budget Item Justification

This Project investigates individual and crew-served weapon designs and technologies that enhance the fighting capabilities and survivability of the dismounted Warfighter in support of all of the Services. In addition, it conceives and advances weapon concepts based on innovative ballistic and advanced incapacitation technologies that will enhance the defeat of hard and soft infantry targets at extended ranges based upon the Joint Service Small Arms Technology Development Strategy (JSATDS). The Project will continue to support technology needs from all Services to include the Next Generation Family of Weapons. In addition, this Project will develop the technology/weapons concepts that will upgrade medium and heavy support weapons at echelons. Finally, this Project will perform research directed toward non-kinetic modalities to incapacitate combatants.

Work in this Project supports key Army needs and leverages the technical research of several Program Elements (PEs) to include PE 0601102A (Defense Research Sciences) / Project AA7 (Mechanics and Ballistics), PE 0603118A (Soldier Lethality Advanced Technology), and PE 0602141A (Lethality 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 Armaments Center (AC) and Army Research Laboratory (ARL).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Soldier/Squad Lethality Technology	4.676	3.848	3.875
Description: This effort conceives and investigates advanced weapons concepts based on innovative ballistic technologies that will enhance the defeat of hard and soft infantry targets at extended ranges to ensure overmatch for Soldier Lethality. This effort will also perform research directed toward non-ballistic modalities to incapacitate combatants.			
FY 2024 Plans: Will develop lethal mechanisms related to the mounted machine gun roll to include defilade mission; investigate threat progression and how it relates to lethal mechanism performance in small caliber projectiles; complete development and validation of automatic jump range/approach for dispersion reduction; conduct advanced diagnostic experiments of novel propellant charges; investigate opportunities to improve performance of heavy mounted weapons in the platoon; mature weapon technologies enabling high performance, compact lightweight weapons; utilize modeling and simulation to assess the effects of standoff energy delivery and expand experimental capability.			
FY 2025 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602143A / *Soldier Lethality Technology*	**Project (Number/Name)** AY6 / *Soldier Squad Small Arms Armaments Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Will assess viability of candidate lethal mechanisms related to the mounted machine gun (MG) role to include defilade mission; mature understanding of threat growth implications to medium machine gun (MMG) and mounted MG capabilities; validate the fundamental explanations for the dispersion reductions in Next Generation Squad Weapons allowing for applications to other types of systems; conduct advanced diagnostic laboratory experiments of novel propellant charges; assess system applications and validate weapon technologies enabling high performance compact lightweight weapons; complete theoretical and computational analyses for prescribing near-field energy field parameters for biological effects; validate the ability to produce scalable incapacitating effects using near-field energy field mechanism in the appropriate biological model. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase is an economic adjustment.			
Title: Small Arms Enabling Technologies ***Description:*** This effort designs and develops small arms weapon systems, enablers, and ammunition technologies that will maintain decisive lethal overmatch capabilities to the Joint Warfighter. This effort matures small arms weapon system designs in support of Joint Warfighter's capability needs. ***FY 2024 Plans:*** Will investigate future small arms concepts to enable a more efficient and lethal Joint Warfighter; design concepts to explore new small arms characterization techniques and metrics; investigate machine gun component technology for increased volume fire effectiveness from small units; validate algorithms and models used for advanced ballistics and holistic weapon signature system analysis; investigate fire control components and methodologies to improve future small arms system precision; develop technologies supporting future remote small?arms systems. ***FY 2025 Plans:*** Will design concepts to study small arms characterization techniques and metrics; design and develop machine gun component technology for increased volume fire effectiveness; mature algorithms and models used for advanced ballistics and holistic weapon signature system analysis; investigate fire control components and methodologies to improve future small arms system performance and emission reduction. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase is an economic adjustment.	6.286	6.295	6.468
Accomplishments/Planned Programs Subtotals	10.962	10.143	10.343

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602143A / *Soldier Lethality Technology*	**Project (Number/Name)** AY6 / *Soldier Squad Small Arms Armaments Technology*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army			Date: March 2024
Appropriation/Budget Activity 2040 / 2	R-1 Program Element (Number/Name) PE 0602143A / *Soldier Lethality Technology*	Project (Number/Name) AY8 / *Small Arms Fire Control Technology*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
AY8: *Small Arms Fire Control Technology*	-	2.091	-	-	-	-	-	-	-	-	0.000	2.091

A. Mission Description and Budget Item Justification

This Project designs and develops technology for advanced small arms fire control in order to achieve lethality overmatch by supporting target prioritization, enhancing processing of information from multiple sources, and investigating aim assistance tools which remove Soldier aim error. This Project specifically supports the Army Science and Technology Soldier Lethality modernization priority.

Work in this Project complements work done in Program Element (PE) 0603118A (Soldier Lethality Advanced Technology) / AY7 (Small Arms Fire Control Advanced Technology).

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) efforts.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Adv. Fire Control Tech	2.091	-	-
Description: This Project investigates software and hardware mechanisms to enable enhanced kill chain processes on small arms platforms. This includes investigating artificial intelligence and neural network hardware, conducting experiments on both Commercial and Government Off-The-Shelf (COTS and GOTS) artificial intelligence and machine learning algorithms, and validating Soldier accuracy performance models. It also includes investigation of lightweight optical components and determines viability of weight reduction and balancing approaches.			
Accomplishments/Planned Programs Subtotals	2.091	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army											Date: March 2024	
Appropriation/Budget Activity 2040 / 2					R-1 Program Element (Number/Name) PE 0602143A / *Soldier Lethality Technology*				Project (Number/Name) AZ2 / *Body Armor & Integrated Headborne Technology*			
COST ($ in Millions)	**Prior Years**	**FY 2023**	**FY 2024**	**FY 2025 Base**	**FY 2025 OCO**	**FY 2025 Total**	**FY 2026**	**FY 2027**	**FY 2028**	**FY 2029**	**Cost To Complete**	**Total Cost**
AZ2: *Body Armor & Integrated Headborne Technology*	-	6.617	6.321	5.807	-	5.807	5.814	5.817	5.881	5.941	0.000	42.198

A. Mission Description and Budget Item Justification

This Project investigates and develops materials for Soldier-borne protective equipment, such as body armor and combat helmets, to increase protection from ballistic, blast, and blunt impact threats. This Project also investigates and executes systematic studies to design and develop materials, devices, systems and methods that enable the identification of protective solutions against ballistic, blast and directed energy threats. Included are investigations of emerging technologies, novel materials, and test methods and integration of personal armor, combat helmets, hearing protection, eyewear, and other personal protective equipment items.

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 Soldier Center (SC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Body Armor & Integrated Headborne Technology	6.617	6.321	5.807
Description: This research effort supports the investigation of novel materials, component designs, and material modeling to design and develop technologies that protect Soldiers against ballistic, blast, and directed energy threats. This effort utilizes a cross-disciplinary, human-focused approach to develop technologies which optimize tradeoffs in ballistic and blast protective component design. This effort addresses the Army challenge of easing overburdened Soldiers in small units and aligns to Soldier protection modernization priorities.			
FY 2024 Plans: Will mature film- insert molding- processing approaches that will enable integration of multi-layered lenses for eyewear and head mounted displays; optimize anti-scratch coatings to produce extreme high hardness durable lens surfaces to protect sophisticated head mounted displays and eyewear; optimize active and passive anti-fog technology; design and develop active cooling technology for integration into combat helmet systems; optimize the ability to highly control and engineer the structure of high performance composite armor subsystems via ultrasonic lamination techniques to produce increased protection against small arms threats; investigate threat- specific failure mechanisms and their relationship to microstructural parameters.			
FY 2025 Plans: Will characterize relationship between processing parameters, microstructure, and ballistic performance of state of the art ballistic materials; explore improvements to helmet preform processing methods to achieve desired microstructures; develop novel helmet materials and design concepts to achieve protection parity with vital torso armor; mature novel headform concept for dynamic			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602143A / *Soldier Lethality Technology*	**Project (Number/Name)** AZ2 / *Body Armor & Integrated Headborne Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
measurements of behind-helmet energy transfer during ballistic impact; mature electrowetting component technologies for low-powered antifogging solution for combat eyewear; investigate new active laser eye protection technology concepts and assess sensory protection gaps against emerging directed energy threats; investigate innovative backing materials to reduce behind armor blunt trauma and improve edge performance of vital torso protection; design and develop new approaches to scalable plate protection which incorporates novel materials and processing techniques; determine the feasibility of conformal and extreme complex geometries with respect to ballistic performance; develop a test method to evaluate combat uniforms and blast protective equipment against long duration multi-fragmentation threats (earth, soil, structure, etc.). ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding decrease reflects planned lifecycle of this effort.			
Accomplishments/Planned Programs Subtotals	6.617	6.321	5.807

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army			Date: March 2024
Appropriation/Budget Activity 2040 / 2	R-1 Program Element (Number/Name) PE 0602143A / *Soldier Lethality Technology*	Project (Number/Name) AZ5 / *Soldier Protection Technology - Vulnerability*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
AZ5: *Soldier Protection Technology - Vulnerability*	-	10.734	11.370	11.397	-	11.397	11.409	11.416	11.540	11.656	0.000	79.522

A. Mission Description and Budget Item Justification

This Project investigates and develops Soldier protection methodologies, which includes the materials, methods, and models that enable design and integration of emerging material technologies into lightweight, flexible and modular Soldier equipment to protect against the range of existing and emerging battlefield threats for head, torso, and extremity protection. Specific research thrusts include the development of materials and mechanisms to enhance ballistic protection; computational models and associated laboratory experiments to provide a fundamental understanding of material properties and failure mechanisms, as well as correlation to ballistic/blast/blunt impact performance of Soldier personal protective equipment (PPE) and improved fibers, composite, and ceramic materials. Specific technologies support experimental helmets that reduce impact and blast loading to the head, Soldier torso protection systems to increase protection from ballistic and blunt impacts, and novel fibers and fabrics that provide additional survivability mechanisms.

Work in this Project supports key Army needs and is fully coordinated with several PEs to include PE 0602143A (Soldier Lethality Technology) and 0603118A (Soldier Lethality Advanced Technology); and leverages the technical research of several PEs to include PE 0601102A (Defense Research Sciences) / Project AA7 (Mechanics and Ballistics) and 0602144A (Ground Technology) / Project BL1 (Materials and Manufacturing Research 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 Army Research Laboratory (ARL).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Soldier Protection Technologies	3.836	4.047	4.075
Description: This effort develops integrated lightweight, flexible, and modular protection equipment that is tailored to support the 'Soldier as a system' approach for defeat of emerging threats. Research areas encompass high fidelity ballistic impact injury models for hard and soft tissues, novel ceramic architectures to include graded and hierarchically structured ceramics, and novel fiber solutions for backing materials to deliver Soldier protection systems to meet emerging ballistic and signature management threats. This effort supports small caliber lethal mechanisms research in PE 0602143A (Soldier Lethality Technology) / Project AY6 (Soldier Squad Small Arms Armaments Technology).			
FY 2024 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602143A / *Soldier Lethality Technology*	**Project (Number/Name)** AZ5 / *Soldier Protection Technology - Vulnerability*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Will mature and transition armor design to defeat advanced threats; document ballistic performance and manufacturing requirements for the advanced armor technology; develop and analyze conformal armor concepts to improve Soldier effectiveness; validate improved computational tools for ceramic-composite armor technology. ***FY 2025 Plans:*** Will augment and apply computational tools for ceramic-composite armor technology along with computational methods for critical tissue injury assessment for protection against current and emerging threats; implement conformal armor concepts into integrated protection system solutions; insert emerging material and fabrication solutions for robust protection systems. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase is an economic adjustment.			
Title: Soldier-Borne Composite Materials ***Description:*** Utilizing understanding of fibers, fabrics, and composite materials, conduct applied research of emerging lightweight materials and structures to enable affordable designs for head, torso, and extremity protection systems. Provide quantitative scientific basis for modeling and simulation that result in materials that utilize new schemes to enhance Warfighter survivability. This effort supports Soldier Protection Technologies bullet.	2.776	-	-
Title: Soldier-Borne Advanced Protection Materials ***Description:*** Utilizing understanding of protection materials such as armor ceramics and associated failure mechanisms, conduct applied research of emerging armor materials to enable affordable design of lightweight ballistic protective systems for the future Soldier. Provide quantitative scientific basis for modeling and simulation that result in materials that utilize new lethal mechanisms/ protection schemes for the individual Warfighter. This effort supports Soldier Protection Technologies bullet and small caliber lethal mechanisms research in PE 0602143A (Soldier Lethality Technology) / Project AY6 (Soldier Squad Small Arms Armaments Technology). ***FY 2024 Plans:*** Will further investigate highly diamond-loaded composite ceramics for advanced ceramic plates; refine and innovate novel manufacturing approaches for achieving improved diamond packing and bulk density; perform residual stress characterization, analysis, and optimization from micro-scale to meso-scale to achieve ideal pre-stresses at material interfaces; integrate diamond composites into heterogenous ceramic assemblies via strike face, layering, and inclusion strategies; develop improved processing, ply orientation, and consolidation strategies for high performance, fiber-reinforced composites to achieve optimal system-level mechanical performance; engineer bonding and integration strategies for composites and ceramics to create armor packages that incorporate improved ballistic response relative to state-of-the-art. ***FY 2025 Plans:***	4.122	4.398	4.378

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602143A / *Soldier Lethality Technology*	**Project (Number/Name)** AZ5 / *Soldier Protection Technology - Vulnerability*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Will refine and mature highly diamond-loaded composite ceramics for advanced ceramic plates; validate novel manufacturing approaches for achieving improved diamond packing and bulk density; optimize micro-scale to meso-scale designs to achieve ideal pre-stresses at material interfaces; continue to integrate diamond composites into heterogenous ceramic assemblies via strike face, layering, and inclusion strategies; conduct experiments on ceramic materials with geometries and structures for point-of-need protection; refine and mature improved processing, ply orientation, and consolidation strategies for high performance, fiber-reinforced composites to achieve optimal system-level mechanical performance; validate engineer bonding and integration strategies for composites and ceramics to create armor packages that incorporate improved ballistic response relative to state-of-the-art. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding decrease reflects planned lifecycle of this effort.			
Title: Novel Camouflage and Concealment Materials ***Description:*** The modern battlefield presents a new generation of detection threats across a wide range of wavelengths and host platforms, coupled with increasingly sophisticated computational analysis tools for identification and targeting. This effort will develop new materials and manufacturing concepts that enable a new generation of lightweight, efficient camouflage and concealment systems for the dismounted Soldier. ***FY 2024 Plans:*** Will develop material synthesis pathways for creating fillers with tailored or dynamic spectral properties for future integration into coatings, fibers, and composites; characterize materials via directional spectroscopy, and utilize machine learning strategies for identifying optimized material designs; generate structurally robust, first-generation materials with engineered thermal conductivity, and characterize and report properties and pathways for further material development; identify opportunities for materials to influence decoy and deception systems, particularly for autonomous assets in support of small dismounted Soldier Teams. ***FY 2025 Plans:*** Will research novel camouflage and concealment materials identified as providing extreme material performance opportunities for use in decoy and deception systems; assess reported properties and pathways for materials developed through first generation machine learning strategies for further material development; design and develop materials providing novel camouflage and concealment to provide decoy and deception capabilities for autonomous assets in support of small dismounted Soldier teams and unit formations; validate material performance for further maturation through manufacturing science. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase is an economic adjustment.	-	2.925	2.944
Accomplishments/Planned Programs Subtotals	10.734	11.370	11.397

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602143A / *Soldier Lethality Technology*	**Project (Number/Name)** AZ5 / *Soldier Protection Technology - Vulnerability*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army			Date: March 2024
Appropriation/Budget Activity 2040 / 2	R-1 Program Element (Number/Name) PE 0602143A / *Soldier Lethality Technology*	Project (Number/Name) AZ9 / *Soldier Protection Advanced Tech - Detectability*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
AZ9: *Soldier Protection Advanced Tech - Detectability*	-	1.747	-	-	-	-	-	-	-	-	0.000	1.747

A. Mission Description and Budget Item Justification

This Project investigates and designs novel materials, technologies, techniques and applications increasing the capabilities of camouflage and concealment against known and emerging sensor threats. The results of this Project enable effective deception capabilities, combinations of physical and electronic signature decoy components, and determination of analytical processes for modeling signature management technologies during multi-domain operations. These technologies will provide subsystems and concepts that shall 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 dismounted soldiers. Components designed under this Project will transition to Advanced Technology Development efforts in Soldier Lethality protection/survivability Projects to provide disruptive Camouflage, Concealment and Deception technologies to the Operational Army to support expeditionary maneuver in the Multi-Domain Battle Environment and retain windows of advantage.

Work in this Project supports key Army needs and leverages/complements the technical research of several Program Elements (PEs) to include PE 0601102A (Defense Research Sciences) and PE 0603118A (Soldier Lethality Advanced Technology) / Project AZ8 (Soldier - Small Unit Detectability Adv 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 Soldier Center.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Camouflage, Concealment and Decoys Technologies for Soldier and High-Value Assets	1.747	-	-
Description: This effort investigates and designs materials, processes, and concepts for innovative camouflage, concealment and deception technologies for Soldier to defeat advanced current and emerging adversary Intelligence, Surveillance and Reconnaissance (ISR) threats and to reduce the probability of detection in multi-domain operations. Investigates analytical processes to model material and system performance and predict probability of detection 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	1.747	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602143A / *Soldier Lethality Technology*	**Project (Number/Name)** AZ9 / *Soldier Protection Advanced Tech - Detectability*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army			Date: March 2024
Appropriation/Budget Activity 2040 / 2	R-1 Program Element (Number/Name) PE 0602143A / *Soldier Lethality Technology*	Project (Number/Name) BB4 / *Dismounted Soldier Survivability Materials*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
BB4: *Dismounted Soldier Survivability Materials*	-	2.948	4.985	5.267	-	5.267	5.355	7.867	7.905	7.984	0.000	42.311

A. Mission Description and Budget Item Justification

This Project investigates fibers, textiles, components, and materials focused on enhancing Soldier survivability from combat threats (flame and thermal, blast and ballistic, multispectral sensor, and laser threats) and environmental threats (e.g., cold, heat, wet, vector, antimicrobial, etc.) to increase operational effectiveness while decreasing the Soldier's physical and cognitive burden. The results from this Project will transition knowledge, materials, subcomponents and methods to Advanced Technology Development efforts in support of enhancing Soldier Lethality by providing protective material solutions focused on the aspects of dismounted movement and maneuver operations of the Army. This Project develops and applies validation methods that enable systematic studies of human systems integration principles and practices to protective equipment materials and designs to advance the understanding of trade-offs between protection, lethality, and mobility.

Work in this Project supports key Army needs and leverages/complements the technical research of several Program Elements (PEs) to include PE 0601102A (Defense Research Sciences), PE 0602143A (Soldier Lethality Technology) / Project AZ5 (Soldier Protection Technology - Vulnerability), and PE 0603118A Soldier Lethality Advanced Technology / Project BB3 (Dismounted Soldier Survivability Equip/Tech Integ).

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 Soldier Center (SC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Dismounted Soldier Survivability Materials	2.948	4.985	5.267
Description: This effort investigates materials, devices and methods that aid in the design and development of multifunctional materials for Soldier protective clothing and individual equipment. This effort conducts research to investigate and identify multi-functional material properties at the micron and sub-micron level to mitigate Soldiers susceptibility and vulnerability to operational threat, i.e., flame, thermal, environmental, and multispectral sensors. Efforts also investigate and develop devices and systems that enable extended dismounted mission duration by reducing the demand for water resupply and enabling Squad organic water filtration systems			
FY 2024 Plans: Will validate the performance of four classes of engineered fibers and yarns (ballistic protection, vector protection, flame resistance, moisture wicking) at the textile and fabric level prior to multi-functional textile integration; integrate engineered fibers and yarns from the four classes of functionality into a single fabric to conduct investigations to assess baseline performance; investigate the effect of weave construction and machine processing parameters on the performance of multi-functional textiles			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602143A / *Soldier Lethality Technology*	**Project (Number/Name)** BB4 / *Dismounted Soldier Survivability Materials*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
to establish sub-system functionality and performance against target metrics; conduct a study on polymer compounding to design conductive fibers for e-textile applications; validate the electrical and data carrying capability of thread coated conductive yarns in breadboard e-textile designs; research the mechanical properties and durability of baseline e-textile materials; design and develop e-textiles interfaces between Soldier uniform and power and data platforms; research in collaboration with Development Command (DEVCOM) Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance and Reconnaissance (C5ISR) partners the functional components of aided target recognition algorithms and their ability to detect, recognize and identify dismounted Soldiers in support of investigating novel camouflage material approaches to reduce the effectiveness of these emerging threat sensor capabilities. ***FY 2025 Plans:*** Will perform studies to determine the effect of fiber spinning process parameters on the properties and fabrication of engineered fibers; investigate yarn design effect on properties and functionality, and design yarns to enhance multifunctional properties; investigate knitting, weaving and advanced fabric design methods to enhance blast debris protection, vector protection, flame resistance, and moisture wicking of potential military textiles; investigate electronics and programming needed for supporting fabrics with incorporated conductors for power and data; investigate ability to incorporate power and date transmission using commercial sensors; investigate the design and use of a management hub to support power and data distribution within the textile; design and investigate handheld water quality sensors that can measure water quality via more than one indicator (multiplexed); design a single water purification device at the soldier/squad level that combines capabilities to remove microbiological contaminants, hazardous chemicals and salt; investigate novel camouflage material approaches to reduce effectiveness of aided target recognition algorithms and their ability to detect, recognize and identify dismounted soldiers; develop simulated and laboratory-level demonstrators for camouflage materials. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase is an economic adjustment.			
Accomplishments/Planned Programs Subtotals	2.948	4.985	5.267

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army			Date: March 2024
Appropriation/Budget Activity 2040 / 2	R-1 Program Element (Number/Name) PE 0602143A / *Soldier Lethality Technology*	Project (Number/Name) BB5 / *Physical Augmentation: Tech for Human Interactions*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
BB5: *Physical Augmentation: Tech for Human Interactions*	-	0.567	-	-	-	-	-	-	-	-	0.000	0.567

Note

Beginning in FY24 all PE 0602143A (Soldier Lethality Technology) / Project BB5 (Physical Augmentation): Tech for Human Interactions funding will transition to PE 0602143A (Soldier Lethality Technology) / Project BC2 (Next Gen Mobility & Lethality Tech for Warfighters)

A. Mission Description and Budget Item Justification

This Project advances the understanding of human augmentation and interaction for enhanced operational performance with a focus on adaptation, training, human variability, metrics/methodologies for assessment, and task quantification. Research encompasses conducting applied research to develop metrics, measures, tools, and techniques to quantify and understand the relationships that enable maximum effectiveness of integrated Soldier-augmentation technologies. The resulting data are the basis for physical augmentation systems and equipment design standards, guidelines, and intelligent agent requirements to improve equipment operation and Soldier-system synergy. Application of this research will yield reduced workload, reduced Soldier training requirements, enhanced Soldier lethality/survivability, user acceptance, and allow Soldiers to achieve maximum performance. Major efforts explore novel techniques for Soldier assessment, characterization of individual variability effects on performance, development of evidence-based design guidance for the application of augmentation technologies, exploration of the relationship of exoskeleton and physical-assist device adaptation and baseline Soldier parameters such as gait, neuromuscular motor control and proprioception. This Project will also explore novel training paradigms for reduced Soldier-augmentation technology adaptation times to address current and future warrior performance issues. Individual efforts exploit wearable sensor technologies, translate surrogate task performance to operational outcomes, develop approaches to distinguish tasks and individual state and intent of movement, establish database of human movement variability to inform intelligent system design, and identify high impact applications of augmentation.

Work in this Project supports key Army needs and leverages the technical research of several Program Elements (PEs) to include PE 0602143A (Soldier Lethality Technology) / Project BC2 (Next Gen Mobility & Lethality Tech for Warfighters) and Project BC6 (Human Perf - Tech for Warfighter Enhancement); and supports PE 0603118A (Soldier Lethality Advanced Technology) / Project BC1 (Human Performance AdvTech for Mobility & Lethality). Additionally, work in this Project complements and is fully coordinated with the Medical Research and Development Command under the Military Operational Medicine Research Program within PE 0602787A (Medical Technology) / Project MK4 (Warfighter Health Applied Research Technology), and the Veteran Administration's exoskeleton research area. 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: Protection, Sustainment, and Warfighter Performance and with our international partners through The Technical Cooperation Program / Human Resources and Performance Group / Panel JP1 (TTCP HUM JP1).

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 Soldier Center (SC).

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602143A / *Soldier Lethality Technology*	**Project (Number/Name)** BB5 / *Physical Augmentation: Tech for Human Interactions*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Training Adaptation and Movement Science	0.567	-	-
Description: This effort investigates the science behind movement for physical augmentation to maximize mobility capacity and training adaptation to decrease learning curve with physical augmentation systems (e.g., physical-assist devices, exoskeletons). This work will enable the Army to make informed decisions on the ultimate effectiveness of human augmentation technologies before significant resources are expended.			
Accomplishments/Planned Programs Subtotals	0.567	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army											Date: March 2024	
Appropriation/Budget Activity 2040 / 2					R-1 Program Element (Number/Name) PE 0602143A / *Soldier Lethality Technology*				Project (Number/Name) BC2 / *Next Gen Mobility & Lethality Tech for Warfighters*			
COST ($ in Millions)	**Prior Years**	**FY 2023**	**FY 2024**	**FY 2025 Base**	**FY 2025 OCO**	**FY 2025 Total**	**FY 2026**	**FY 2027**	**FY 2028**	**FY 2029**	**Cost To Complete**	**Total Cost**
BC2: *Next Gen Mobility & Lethality Tech for Warfighters*	-	4.259	6.894	8.334	-	8.334	8.120	11.100	11.171	11.282	0.000	61.160

A. Mission Description and Budget Item Justification

This Project investigates the means to monitor, assess, predict and optimize/enhance Soldier and squad decision-making and shoot and move performance. In addition, it will provide design guidance for individual and mission specific equipment (e.g., individual protection, small arms, load carriage, information portrayal etc.) and quantitative impacts of mission and associated clothing and individual equipment (CIE) on individual and small unit performance. Research conducted focuses on translating mission tasks to measures of human performance. These measures of human performance will inform predictive algorithms, human based modeling and simulation, and assessment tools that enable Soldier performance trade space analysis for acquisition, training, and operations. These data and algorithms will allow us to determine the impact of new capabilities on Soldier and Squad performance and effectiveness, understand deficiencies in performance and investigate novel strategies to optimize and enhance performance.

Work in this Project complements and is fully coordinated with the Medical Research and Development Command under the Military Operational Medicine Research Program as well as Defense Medical Research and Development Program under Military Operational Medicine (JPC-5) to include Projects in PE 0602787A (Medical Technology). This Project also complements and is fully coordinated with work performed across Army, Navy, and Air Force under the Human Systems Community of Interest: Protection, Sustainment, and Warfighter Performance.

This Project supports key Army needs and leverages the technical research of several Program Elements (PEs) to include the following: PE 0602143A (Soldier Lethality Technology) / Projects BC6 (Human Perf-Tech for Warfighter Enhancement), and PE 0603118A (Soldier Lethality Advanced Technology)/ Projects BC1 (Human Performance Adv Tech for Mobility & Lethality). This Project also supports and leverages PE 0603118A (Soldier Lethality Advanced Technology) / Project AY9 (Body Armor & Integrated Headborne Advanced Tech), and Project BD7 (Soldier Sys Interfaces/Integration- Sensor Adv Tech).

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 Soldier Center (SC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Human Interaction for Mobility & Lethality	4.259	6.894	8.334
Description: This effort investigates and develops human performance based design guidance for protection and weapon systems and sub systems to improve the mobility and lethality of individuals and small units. The applied research translates traditional means for measuring and understanding human performance to the means to conduct assessment for Warfighter and small unit readiness and/or new capabilities.			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602143A / *Soldier Lethality Technology*	**Project (Number/Name)** BC2 / *Next Gen Mobility & Lethality Tech for Warfighters*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
FY 2024 Plans: Will investigate stressor interactions on Soldier, small unit, and leader tactical outcomes to advance predictive modeling; conduct experiments on the effects of head-support load and distribution configurations on female and male Soldier task performance to refine head supported mass guidelines and modeling and simulation tools; develop female & male neck models (or other anatomical models as needed) for headborne system design guidance; conduct experiments to address gaps in the optimization of augmented reality (AR) design elements, interactions, applications, and performance metrics to inform heads-up display (HUD) systems; begin the development of novel HSI test methodologies to inform lethality trade space impacts of Soldier clothing and individual equipment (CIE) and technologies; investigate novel cognitive and physical enhancement strategies on Soldier task performance and recovery. ***FY 2025 Plans:*** Will investigate a probiotic bacteria designed to mitigate fatigue and enhance Warfighter operational performance in a human study under simulated operational stress (sleep deprivation); investigate novel means (e.g., cognitive resistance training, neurostimulation, biofeedback, supplementation, physical augmentation systems) and guidelines for use to enhance Soldier performance; initiate the development of novel metrics to quantify the impacts of Soldier clothing and individual equipment (CIE) on Soldier performance that align to mobility, lethality and survivability continue to investigate the effects of head supported mass on Soldier task performance in order to develop higher fidelity models for simulation to inform headborne system design; conduct investigations to determine optimal combinations of information presentation and multimodal system inputs (e.g., gesture, gaze, voice, head movements) to optimize human performance when interacting with augmented reality during operationally relevant tasks; continue to conduct meta-analyses and conduct investigations to fill gaps of understanding between known stressors and their interaction on Soldier performance outcomes (e.g., reaction time, memory, endurance, strength, executive function, etc.). ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase reflects the planned design and development of methods, metrics, and tools to quantify and inform the Soldier lethality trade space and the maturation of human performance models for readiness quantification and prediction.			
Accomplishments/Planned Programs Subtotals	4.259	6.894	8.334

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army											Date: March 2024	
Appropriation/Budget Activity 2040 / 2					R-1 Program Element (Number/Name) PE 0602143A / *Soldier Lethality Technology*				Project (Number/Name) BC6 / *Human Perf - Tech for Warfighter Enhancement*			
COST ($ in Millions)	**Prior Years**	**FY 2023**	**FY 2024**	**FY 2025 Base**	**FY 2025 OCO**	**FY 2025 Total**	**FY 2026**	**FY 2027**	**FY 2028**	**FY 2029**	**Cost To Complete**	**Total Cost**
BC6: *Human Perf - Tech for Warfighter Enhancement*	-	1.348	-	-	-	-	-	-	-	-	0.000	1.348

Note

Beginning in FY24 all PE 0602143A / Soldier Lethality Technology Project BC6 / Human Perf - Tech for Warfighter Enhancement funding will realign to PE 0602143A / Soldier Lethality Technology BC2 / Next Gen Mobility & Lethality Tech for Warfighters.

A. Mission Description and Budget Item Justification

This Project investigates and develops mechanisms for safely and effectively optimizing and enhancing Warfighter ability to shoot, move, communicate, and decide. These mechanisms have the potential to exploit the Soldier and Squad as the capability platform beyond materiel solutions provided to the individual and small unit. This project also conducts investigations to populate human performance models that enable trade space analysis for portions of doctrine, organization, training, materiel, leadership and education, personnel and facilities (DOTMLPF) analysis.

This Project supports key Army needs and leverages the technical research of several Program Elements (PEs) / Projects to include: PE 0602143A (Soldier Lethality Technology) / BE3 (Joint Service Combat Feeding Technology) and BE2 (Joint Service Combat Feeding Advanced Technology).

Work in this Project complements and is fully coordinated with the Medical Research and Development Command under the Military Operational Medicine Research Program as well as Defense Medical Research and Development Program under Military Operational Medicine (JPC-5) to include Projects in PE 0602787A (Medical Technology). 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: Protection, Sustainment, and Warfighter Performance. Work in this Project complements and is fully coordinated with research at the US Army Combat Capabilities Development Command Army Research Laboratory (ARL).

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 Soldier Center (SC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Human Performance Technology for Warfighter Enhancement	1.348	-	-
Description: This effort investigates mechanisms for exploiting human physiology to develop safe and effective interventions that create smarter, faster, more lethal Close Combat Warfighters. This work will result in a Soldier's ability to shoot, move, communicate, and decide faster than an adversary. Findings from these investigations will leverage existing systems and platforms to get the greatest human performance return in training and operations.			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602143A / *Soldier Lethality Technology*	**Project (Number/Name)** BC6 / *Human Perf - Tech for Warfighter Enhancement*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Accomplishments/Planned Programs Subtotals	1.348	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army											Date: March 2024	
Appropriation/Budget Activity 2040 / 2					R-1 Program Element (Number/Name) PE 0602143A / *Soldier Lethality Technology*				Project (Number/Name) BC7 / *Training Technology (Other than STE)*			
COST ($ in Millions)	**Prior Years**	**FY 2023**	**FY 2024**	**FY 2025 Base**	**FY 2025 OCO**	**FY 2025 Total**	**FY 2026**	**FY 2027**	**FY 2028**	**FY 2029**	**Cost To Complete**	**Total Cost**
BC7: *Training Technology (Other than STE)*	-	24.354	33.822	29.446	-	29.446	26.831	21.505	21.748	21.966	0.000	179.672

A. Mission Description and Budget Item Justification

This Project funds research into technologies and their applications that can inform and/or enhance the Army's live, virtual, and constructive training systems. This Project conducts research in immersive virtual, mixed, and augmented reality (AR) environments that stimulate human senses (e.g., sight, sound, and touch) and also conducts laboratory experiments to understand how users interface with the technology in order to improve the realism of simulation environments and therefore create enhanced immersion and more effective training systems. Models and simulations are designed are developed to allow realistic, fair fight engagements across all training environments and training devices, to include the cyberspace domain. Included in the investigations of this Project are also medical training systems (e.g., part-task trainers and physiological modeling).

Work in this Project supports key Army needs and complements efforts in Program Element (PE) 0603118A (Soldier Lethality Advanced Technology) / Project BC8 (Training Advanced Technology (Other than 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 Soldier Center (SC) and the Institute for Creative Technologies (ICT) University Affiliated Research Center (UARC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Medical Training Technology	3.111	3.599	3.363
Description: Included in this effort will be the development of new medical training simulations to train medical personnel across all levels of care. Improvements in haptic capabilities will ensure hyper bio-fidelity for all levels of care. Automated measures of student performance will support Army medical Individual Critical Task Lists (ICTLs). Research areas will also include more realistic tissue properties supporting part-task trainers and modular patient simulator systems. Initial exploration of Army ICTLs will result in early proof-of-concept development of proof-of concept training systems to support non-traditional medical areas, such as dental training simulations.			
FY 2024 Plans: Will mature the usability and training effectiveness of an integrated collective live, virtual, constructive medical training capability; design and develop optimum physiology engine(s) and haptic configuration leveraging modular manikin and haptic capabilities for defined scenarios that support Army medical training, such as extended care in an austere environment, gender care differences, and patient hand-off.			
FY 2025 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602143A / *Soldier Lethality Technology*	**Project (Number/Name)** BC7 / *Training Technology (Other than STE)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Will implement/integrate physical and software solutions for prolonged care in support of Multi-Domain Operations (MDO) training environment; validate consolidated physiology engine and updated haptic hardware against more dynamic prolonged care use cases that support Army medical training, such as extended austere environment, gender care differences and patient handoff. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding decrease reflects completion of initial design and development for physiology engine and migration into validation testing for specific Prolonged Care use cases.			
Title: Warfighting M/S Concepts and Design (ICT) ***Description:*** This Project designs and develops photorealistic synthetic environments, multi-sensory interfaces, artificially intelligent agents, and human performance assessment technologies to create virtual, augmented, and mixed reality simulation environments for training. This Project uses advanced modeling, simulation, and leadership development techniques to leverage the emerging immersive technologies of industry and the research and development community to advance the Army's capabilities. ***FY 2024 Plans:*** Will mature automation techniques to develop individual agent and aggregate unit behaviors to represent friendly forces, hostile forces, and civilian groups in virtual training exercises; investigate methods for the realistic physical and mental representation of individual Soldiers; fund research to determine how to improve Soldier cognitive and experiential learning; investigate adaptive, multi-modal interfaces for Army-specific applications of augmented reality technologies; validate methods to synchronize light detection and ranging (LIDAR) and photogrammetry data collected in the real world to enhance the realism of simulation-based training. ***FY 2025 Plans:*** Will investigate novel educational, operational, and training applications of emergent artificial intelligence (AI) methods such as generative AI; develop military-relevant AI training methods to expand the utility of AI for generating educational-, training-, or operational-insights and recommendations; continue investigation of adaptive, multi-modal interfaces for Army-specific applications of augmented reality applications; fund research to study staff-specific learning outcomes to better deliver content and improving training outcomes. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding decrease corresponds to starting fewer numbers of new innovation proposals.	6.995	7.360	5.399
Title: Digital Terrain for Live Training ***Description:*** This effort investigates technologies to enhance the fidelity and visual effects of digital terrain for live training systems, with an objective metric of reducing overall training time to gain proficiency in the live environment. It addresses live training needs for conducting force-on-force, combined arms exercises to enhance readiness at Army home stations and	5.478	6.970	6.545

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602143A / *Soldier Lethality Technology*	**Project (Number/Name)** BC7 / *Training Technology (Other than STE)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Combat Training Centers by enhancing vertical terrain resolution, physics-based blast effects on terrain, and data compression technologies. ***FY 2024 Plans:*** Will mature existing physics-based algorithms for munitions effects;, design novel wireless data compression methods for feature attribution in live- synthetic training environments; design data model extensions for terrain accuracy metrics and digital terrain level of detail needs for live training; and design a layered and scalable terrain architecture to support dynamic Live training interactions. ***FY 2025 Plans:*** Will validate physics- based algorithms for munitions effects in live range environment, develop wireless data compression architecture for live/virtual/constructive training environments; develop data models that enable high fidelity engagements in live environment; and develop and implement layered and scalable terrain architecture for live range environment use cases. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding decrease reflects planned completion of component and architecture design.			
Title: Simulation Management Technologies	3.378	8.081	6.513
Description: This effort aims to automate management of resources and equipment associated with the planning, preparation, execution, and assessment of individual through collective training exercises. This effort will inform requirements and research capabilities to enable a self-healing simulation architecture that can automatically architect, configure, detect, deploy, and manage resources to support individual and collective training use-cases. The design and development of fully autonomous constructive models will be leveraged within this architecture to further automate exercise execution and greatly increase time and effectiveness of training and readiness opportunities within the distributed training environment. ***FY 2024 Plans:*** Will investigate hardware acceleration and common platform components; design and develop dynamic behavior algorithms and fitness functions based on training use-cases; design and develop configuration and authoring components to support simulation execution; and conduct experiments aligned to training use-cases to validate architecture. ***FY 2025 Plans:*** Will design and develop hardware acceleration architecture; validate limited number of dynamic behavior algorithms for large scale training exercise use cases; validate configuration and authoring components in relevant planning pre-exercise use cases; and integrate component architectures into a single solution for implementation in execution phase of large scale collective simulated exercises. ***FY 2024 to FY 2025 Increase/Decrease Statement:***			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602143A / *Soldier Lethality Technology*	**Project (Number/Name)** BC7 / *Training Technology (Other than STE)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Funding decrease reflects planned completion of design and development activities, as well as the beginning of architecture validation experiments.			
Title: Multi-Domain Environments for Training ***Description:*** This effort will define a new, common MDO competency framework to drive machine-supported training performance data collection, tracking and readiness projections for current and new MDO use-cases. This effort also investigates emerging operational/training paradigms, including a detailed focus on modeling non-combat factors of operational environments and developing models necessary to train for Information Advantage. ***FY 2024 Plans:*** Will continue development of reusable Measures of Performance/Effectiveness (MOPs/MOEs); design MDO profiles and authoring tools/user interfaces aligned to knowledge, skills, abilities, and behaviors (KSABs) across identified MDO task structures; conduct experiments to validate first order effects in information warfare domain. ***FY 2025 Plans:*** Will develop architecture design leveraging mature/reusable Measures of Performance/Effectiveness (MOPs/MOEs); develop and implement MDO profiles and authoring tools/user interfaces aligned to knowledge, skills, abilities and behaviors (KSABs) across identified MDO task structures; begin limited design architecture to simulate first order effects in information warfare domain. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding change is consistent with the planned lifecycle of this effort.	5.392	7.812	7.626
Accomplishments/Planned Programs Subtotals	24.354	33.822	29.446

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army			Date: March 2024
Appropriation/Budget Activity 2040 / 2	R-1 Program Element (Number/Name) PE 0602143A / *Soldier Lethality Technology*	Project (Number/Name) BD1 / *Adv Soldier Sensors/Displays Tech for Dismounts*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
BD1: *Adv Soldier Sensors/ Displays Tech for Dismounts*	-	15.939	16.557	16.598	-	16.598	16.609	16.619	16.802	16.970	0.000	116.094

A. Mission Description and Budget Item Justification

This Project designs and develops low power, next generation modular sensor and display components for detection and identification of both threats and friendlies in all environments to increase situational awareness, decrease fratricide, and enable Soldiers to respond more quickly for greater lethality.

This Project complements s work done in Program Element (PE) 0603118A (Soldier Lethality Advanced Technology) / BC9 (Adv Soldier Sensors/Displays AdvTech for Dismounts).

Work in this Project is performed by the Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance and Reconnaissance (C5ISR) Center.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Advanced Soldier Sensors/Displays Technology for Dismounts	15.939	16.557	16.598
Description: This effort models, simulates, investigates, designs, and develops novel low power, modular electro-optic / infrared (EO/IR), displays, augmented reality approaches and integrates aided/automatic target detection and recognition techniques to enable improved Soldier maneuver and lethality through greater information fidelity to increase Soldier probability of recognition/ identification and tracking of all threats.			
FY 2024 Plans: Will investigate mixed and augmented reality (MR/AR) content to Heads Up Displays (HUDs) for representation of threats via automated threat cueing from UAV sources; develop modular virtual prototype environments for expedited User feedback; develop image fusion optimization processes to improve target acquisition of sensor systems with multiple camera sources; conduct experiments to determine performance of Electro Optic/Infrared (EO/IR) sensor performance prediction models; investigate advanced materials and processing methods for improvement in operations within lowest lighting conditions with digital low light sensors; develop material and processing methods to design advanced, high definition longwave infrared (LWIR) sensors for tailorable SWaP and/or target acquisition performance.			
FY 2025 Plans: Will validate representation of autonomous unmanned aerial vehicle cues and operation for minimized cognitive burden to the Soldier. Will investigates optimal data fusion for digital low light and long-wave infrared imagers to improve situational awareness and reduce time to acquire threats. Will investigate degree of tolerable latency for fusion of disparate sensors versus dismounted tasks. Will develop methods to improve alternative advanced materials and processing for imaging during overcast starlight			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602143A / *Soldier Lethality Technology*	**Project (Number/Name)** BD1 / *Adv Soldier Sensors/Displays Tech for Dismounts*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
performance. Will mature improved Complementary Metal-Oxide Semiconductor (CMOS) low light level sensors in clear starlight light levels to validate readiness for integration into host systems. Will mature Read Out Integrated Circuit (ROIC) design and develop reduced pixel pitch high-definition longwave infrared (LWIR) sensors for tailorable SWaP and/or target acquisition performance. Will investigate novel technologies/algorithms to enable next generation micro-displays. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase is an economic adjustment.			
Accomplishments/Planned Programs Subtotals	15.939	16.557	16.598

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army			Date: March 2024
Appropriation/Budget Activity 2040 / 2	R-1 Program Element (Number/Name) PE 0602143A / *Soldier Lethality Technology*	Project (Number/Name) BD6 / *Soldier Sys Interfaces/Integration-Sensor Tech*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
BD6: *Soldier Sys Interfaces/ Integration- Sensor Tech*	-	0.237	0.301	0.401	-	0.401	0.802	0.802	0.902	0.601	0.000	4.046

Note

Project BD6 has realignments from Soldier System Interfaces & Integration (Sensor Technology) within this project and from task PE 0603118A (Soldier Lethality Advanced Technology) / Project BD7 (Soldier Sys Interfaces Integration-Sensor Advanced Technology).

A. Mission Description and Budget Item Justification

This Project investigates, designs, and validates advanced technologies and algorithms for enhancing dismounted Soldier deployed robotics and autonomous systems used to improve the Small Unit's situational awareness, survivability, and lethality. Technologies to be investigated may include: algorithms for dismounted robotic systems to enable autonomous navigation, automated object recognition, persistent surveillance, launch and recovery from vehicles, networked lethality, manned-unmanned teaming, and collaborative behaviors; and advanced user interfaces to optimize human-robotic interaction during dismounted operations. These advanced technologies will enable Squad and Platoon level autonomous reconnaissance using robotic systems to minimize the operator's dedicated control of the systems and reduce their cognitive burden, thus allowing Soldiers to be more lethal and survivable.

Work in this Project supports key Army needs and leverages the technical research of several Program Elements (PEs) / Projects to include PE 0603118A (Soldier Lethality Technology) / Project BD7 (Soldier Sys Interfaces/Integration-Sensor Tech) and Project BC9 (Advanced Soldier Sensors/Displays Advanced Technology for Dismounts).

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 Soldier Center (SC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Soldier System Interfaces & Integration (Sensor Technology)	0.237	0.301	-
Description: This effort will investigate, design, and validate advanced dismounted Soldier robotic and autonomous systems technologies to enable autonomous navigation, manned-unmanned teaming, and networked reconnaissance to improve Soldier lethality, situational awareness, and survivability during tactical operations.			
FY 2024 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602143A / *Soldier Lethality Technology*	**Project (Number/Name)** BD6 / *Soldier Sys Interfaces/Integration-Sensor Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Will conduct experiments on autonomy and teaming technologies for resource constrained Small Unmanned Aerial Systems (SUAS) operating in complex environments to enhance navigation, search capabilities, and extend operations. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding decrease reflects administrative realignment to task Soldier Situational Awareness Advanced Technology within this project.			
Title: Soldier Situational Awareness Technologies ***FY 2025 Plans:*** Will investigate, design and develop, government owned, autonomy and teaming algorithms for resource constrained Army Squad and Platoon level Small Unmanned Aerial Systems (SUAS) to unburden the Small Unit and improve their situational awareness, lethality, and reconnaissance. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase reflects administrative realignment from Soldier System Interfaces & Integration (Sensor Technology) within this project and from task PE 0603118A (Soldier Lethality Advanced Technology) / Project BD7 (Soldier Sys Interfaces Integration-Sensor Advanced Technology).	-	-	0.401
Accomplishments/Planned Programs Subtotals	0.237	0.301	0.401

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army			Date: March 2024
Appropriation/Budget Activity 2040 / 2	R-1 Program Element (Number/Name) PE 0602143A / *Soldier Lethality Technology*	Project (Number/Name) BD8 / *Soldier & Sm Unit Tactical Energy Tech*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
BD8: *Soldier & Sm Unit Tactical Energy Tech*	-	6.291	6.911	7.465	-	7.465	10.575	10.058	10.540	10.646	0.000	62.486

A. Mission Description and Budget Item Justification

This Project conducts applied research and development on materials and component level power and energy technologies in the areas of energy storage, power generation, alternative energy, and intelligent power distribution and thermal management designs that support Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) and Soldier power needs to include next generation squad weapons and advanced optical devices and sensors. Enables future Soldier lethality and mobility for longer mission durations at lighter weights to provide enhanced lethality and tactical overmatch of adversaries, and to reduce the burden on the Soldier.

This Project support key Army needs and complements the technical research of Program Element 0602184 (Soldier Applied Research) / Project CO1 (Soldier Power and Energy Concepts) and Program Element 0603118A (Soldier Lethality Advanced Technology) / BD9 (Soldier & Sm Unit Tactical Energy AdvTech).

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 Army Research Laboratory (ARL) and Command, Control, Communication, Computers, Cyber, Intelligence, Surveillance and Reconnaissance Center (C5ISR) Center.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Tactical Power for Soldier Lethality	5.341	5.946	6.491
Description: This effort investigates, designs, and develops innovative materials and component level power generation and energy storage technologies that support next generation weapons, sensors, radios, and human augmentation devices enabling Soldiers and Small Units to maximize probability of target hits, improve collective situational awareness, ensure multiple communication streams, and assist with tactical tasks in order to decrease Soldier load and power burden, and increase power capabilities by providing more energy to prolong mission run-time.			
FY 2024 Plans: Will mature safe, high voltage electrolyte materials paired with improved Si anode technologies to verify and validate performance of 2x increase for the Conformal Wearable Battery (CWB); design and develop Li-metal components that will enable a 2-3x increase in energy and pair it with safer, high voltage electrolyte materials; design and develop breadboard components for Soldier and Squad power generation technologies, such as fuel cells and solar, to provide battery recharge capability to sustain on-the-move operations and limit battery swaps to enable longer mission durations; investigate scaling 2x power density fuel cell			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602143A / *Soldier Lethality Technology*	**Project (Number/Name)** BD8 / *Soldier & Sm Unit Tactical Energy Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
stacks to platoon power generation requirement; develop and validate family of Si-Anode based Small Tactical Universal Batteries (STUB) to support enabler and small handheld devices for the Soldier. ***FY 2025 Plans:*** Will continue to design and develop Lithium (Li)-metal rechargeable battery components that will enable a 2-3x increase in runtime over fielded batteries. Will mature and scale up Soldier fuel cell technologies for use in squad or platoon power generation to enable longer runtimes and decreased weight and logistical burden for the Soldier and Small Unit. Will investigate electrochemical material development of advanced non-rechargeable batteries materials, such as Lithium Carbon Monofluoride (Li/CFx) and Li/ Sulfur (Li/S), to enable longer runtime at reduced weight for early entry operations. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase is an economic adjustment.			
Title: Materials & Component Technologies for Energy Independence ***Description:*** The effort develops technologies to substantially reduce the number of batteries required to accomplish dismounted Soldier/Squad mission objectives by developing more efficient power and thermal management for small systems and harvesting energy and alternative energy technologies thereby significantly reducing Soldier-borne load and logistics requirements for Soldier/Squad power and energy. ***FY 2024 Plans:*** Will investigate compact heat recirculating burners, including models, designs, and fabrication of burners to increase heat transfer rates that increase power density and efficiency; explore thermophotovoltaic and thermionic designs and improvements that increase power density and efficiency of the thermal-to-electric conversion, and improve coupling efficiency with novel heat sources. ***FY 2025 Plans:*** Will design and develop compact heat recirculating burner components to increase heat transfer rates for higher radiative power density; develop test stands that couple the compact heat recirculating burner with improved thermophotovoltaic and thermionic designs and validate increased radiative power density and power generation efficiency ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase is an economic adjustment.	0.950	0.965	0.974
Accomplishments/Planned Programs Subtotals	6.291	6.911	7.465

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602143A / *Soldier Lethality Technology*	**Project (Number/Name)** BD8 / *Soldier & Sm Unit Tactical Energy Tech*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army											Date: March 2024	
Appropriation/Budget Activity 2040 / 2					R-1 Program Element (Number/Name) PE 0602143A / *Soldier Lethality Technology*				Project (Number/Name) BE3 / *Joint Service Combat Feeding Technology*			
COST ($ in Millions)	**Prior Years**	**FY 2023**	**FY 2024**	**FY 2025 Base**	**FY 2025 OCO**	**FY 2025 Total**	**FY 2026**	**FY 2027**	**FY 2028**	**FY 2029**	**Cost To Complete**	**Total Cost**
BE3: *Joint Service Combat Feeding Technology*	-	4.627	4.074	4.081	-	4.081	4.328	4.980	5.034	5.084	0.000	32.208

A. Mission Description and Budget Item Justification

This Project investigates and develops nutrient compositions and stabilization techniques to maximize the Warfighter's physical and cognitive performance on the battlefield, investigates technologies to enhance detection and identification capabilities of chemical and biological threats in foods, and develops innovative ration and field feeding technologies to reduce resupply requirements for the multi-domain battlefield. 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.

Work in this Program Element (PE) is related to and fully coordinated with PE 0602787A (Medical Technology) / Project MK4 (Warfighter Health Applied Research Technology) to develop technologies and concepts; Army Additive Manufacturing Community of Practice to enable customization, increase readiness, and improve sustainment due to fabrication of end-use items at point of need; Defense Threat Reduction Agency to maximize protection of rations from contamination; Defense Health Agency (DHA) to transition and develop materiel solutions in the microbiome technical areas; and the Defense Health Agency (DHA) Joint Program Committee-5, which seeks to develop effective nutritional countermeasures against stressors and to maximize health, performance, and well-being.

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 Soldier Center (SC).

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2023**	**FY 2024**	**FY 2025**
Title: Joint Service Combat Feeding Technology	4.627	4.074	4.081
Description: This effort investigates, designs, and develops nutrient compositions and stabilization techniques to maximize the Warfighter's physical and cognitive performance on the battlefield. The effort investigates technologies to enhance detection and identification capabilities of chemical and biological threats in foods and develops innovative ration and field feeding technologies to reduce resupply requirements. Work in this area results in increased performance, less food-borne illness, and overall increased readiness of the Warfighter.			
FY 2024 Plans: Will conduct mathematical analysis of lipid stability in nutrient dense rations; investigate compounds to promote protective potential for the probiotic strain during freeze- drying; develop nutritional intervention and placebo bars in support of human performance research in extreme environments; analyze theoretical/empirical data & characterize materials to examine			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602143A / *Soldier Lethality Technology*	**Project (Number/Name)** BE3 / *Joint Service Combat Feeding Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
responsiveness of advanced insulating materials to various stimuli - electro/magneto/thermo/solar; conduct accelerated storage study to mature packaging reduction technologies for operational rations. ***FY 2025 Plans:*** Will investigate performance nutrition and the linkages to cognitive and physical performance; design and develop methodologies to apply both commercial off-the-shelf (COTS) and emerging technologies for the mitigation of food and water contaminants; investigate survey technologies for food contaminant sensors that reduce response time and reagent resupply; and determine assess performance of novel insulation materials for use in field feeding operations. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase reflects planned lifecycle of this effort.			
Accomplishments/Planned Programs Subtotals	4.627	4.074	4.081

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army											Date: March 2024	
Appropriation/Budget Activity 2040 / 2					R-1 Program Element (Number/Name) PE 0602143A / *Soldier Lethality Technology*				Project (Number/Name) BE8 / *Synthetic Training Environment (STE) Technology*			
COST ($ in Millions)	**Prior Years**	**FY 2023**	**FY 2024**	**FY 2025 Base**	**FY 2025 OCO**	**FY 2025 Total**	**FY 2026**	**FY 2027**	**FY 2028**	**FY 2029**	**Cost To Complete**	**Total Cost**
BE8: *Synthetic Training Environment (STE) Technology*	-	5.743	-	-	-	-	-	-	-	-	0.000	5.743

Note

In FY2024 funding realigned to PE 0602184A Project CN2 Intelligent Weapons Concepts and Technology

A. Mission Description and Budget Item Justification

This Project designs and develops technologies supporting 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, 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.

This Project is coordinated with work done in Program Element (PE) 0603118A (Soldier Lethality Advanced Technology) / Project BE9 (STE 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 2023	FY 2024	FY 2025
Title: STE One World Terrain ***Description:*** This effort investigates and designs tools and methods to improve the speed and fidelity of a terrain capability that provides a representation of the globe, fully accessible through the Army network and usable by all simulation trainers; develops complex representations (including megacities and subterranean) of the operational environment and the Multi-Domain battlefield in synthetic training environments.	3.744	-	-
Title: STE Training Management Tool ***Description:*** This effort investigates Adaptive Training (AT) methods to facilitate authoring, distribution, management, and evaluation of tailored instruction for both individuals and teams; and determines the impact of training and education tools/ methods on comprehension, reasoning, learning, performance, retention, and transfer of knowledge and acquired skills to assess Training Effectiveness (TE) in Synthetic Training Environments.	1.999	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602143A / *Soldier Lethality Technology*	**Project (Number/Name)** BE8 / *Synthetic Training Environment (STE) Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Accomplishments/Planned Programs Subtotals	5.743	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army										Date: March 2024		
Appropriation/Budget Activity 2040 / 2					R-1 Program Element (Number/Name) PE 0602143A / *Soldier Lethality Technology*				Project (Number/Name) BP9 / *Soldier Lethality Technologies (CA)*			
COST ($ in Millions)	**Prior Years**	**FY 2023**	**FY 2024**	**FY 2025 Base**	**FY 2025 OCO**	**FY 2025 Total**	**FY 2026**	**FY 2027**	**FY 2028**	**FY 2029**	**Cost To Complete**	**Total Cost**
BP9: *Soldier Lethality Technologies (CA)*	-	164.700	-	-	-	-	-	-	-	-	0.000	164.700

Note

Congressional Interest Item funding provided for Soldier Lethality Technologies.

A. Mission Description and Budget Item Justification

This Project is for congressional increases that support applied research in support of Soldier Lethality, where the Soldier and Squad are treated as an integrated combat platform.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024
Congressional Add: Program increase - Pathfinder Airborne ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Pathfinder Airborne	8.000	-
Congressional Add: Program increase - HEROES Program ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for HEROES	10.000	-
Congressional Add: Program Increase - ADVANCED TEXTILES AND SHELTERS ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for ADVANCED TEXTILES AND SHELTERS	6.000	-
Congressional Add: Program Increase - Digital Night Vision Technology ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Digital Night Vision Technology	9.700	-
Congressional Add: Program Increase - Military Footwear Research ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Military Footwear Research	10.000	-
Congressional Add: Program Increase - Nanolayered Polymer Optics ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Nanolayered Polymer Optics	10.000	-
Congressional Add: Program Increase - ADVANCED BALLISTIC PROTECTION TECHNOLOGY	25.000	-

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602143A / *Soldier Lethality Technology*	**Project (Number/Name)** BP9 / *Soldier Lethality Technologies (CA)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024
FY 2023 Accomplishments: Congressional Interest Item funding provided for ADVANCED BALLISTIC PROTECTION TECHNOLOGY		
Congressional Add: Program Increase - ARTIFICIAL INTELLIGENCE - ENHANCED EDUCATIONAL TECHNOLOGY AND LEARNING ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for ARTIFICIAL INTELLIGENCE - ENHANCED EDUCATIONAL TECHNOLOGY AND LEARNING	5.000	-
Congressional Add: Program Increase - ENHANCED BALLISTIC PROTECTIVE EYEWEAR ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for ENHANCED BALLISTIC PROTECTIVE EYEWEAR	5.000	-
Congressional Add: Program Increase - ENHANCING SOLDIER BALLISTIC TECHNOLOGIES ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for ENHANCING SOLDIER BALLISTIC TECHNOLOGIES	5.000	-
Congressional Add: Program Increase - FLAT PANEL TECHNOLOGY ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Flat Panel Technology	2.000	-
Congressional Add: Program Increase - FUTURE FORCE REQUIREMENTS EXPERIMENTATION ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for FUTURE FORCE REQUIREMENTS EXPERIMENTATION	10.000	-
Congressional Add: Program Increase - INNOVATIVE TRAINING TECHNOLOGIES ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Innovative Training Technologies	5.000	-
Congressional Add: Program Increase - LITHIUM-ION BATTERY CELL RESEARCH PILOT ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for LITHIUM-ION BATTERY CELL RESEARCH PILOT	9.000	-
Congressional Add: Program Increase - PATHFINDER ADAPTIVE EXPERIMENTATION FORCE ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for PATHFINDER ADAPTIVE EXPERIMENTATION FORCE	5.000	-
Congressional Add: Program Increase - PATHFINDER CYBER INITIATIVES	12.000	-

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602143A / *Soldier Lethality Technology*	**Project (Number/Name)** BP9 / *Soldier Lethality Technologies (CA)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024
FY 2023 Accomplishments: Congressional Interest Item funding provided for PATHFINDER CYBER INITIATIVES		
Congressional Add: Program Increase - REGIONAL WORKFORCE PILOT ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Regional Workforce Pilot	10.000	-
Congressional Add: Program Increase - SOLDIER & SMALL UNIT TACTICAL ENERGY TECHNOLOGY ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for SOLDIER & SMALL UNIT TACTICAL ENERGY TECHNOLOGY	3.000	-
Congressional Add: Program Increase - Extended Range and Hybrid Gun Launched Unmanned Aerial Systems ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Extended Range and Hybrid Gun Launched Unmanned Aerial Systems	15.000	-
Congressional Adds Subtotals	164.700	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army										Date: March 2024		
Appropriation/Budget Activity 2040 / 2					R-1 Program Element (Number/Name) PE 0602143A / *Soldier Lethality Technology*				Project (Number/Name) BR9 / *Personnel & Airdrop Safety Technology*			
COST ($ in Millions)	**Prior Years**	**FY 2023**	**FY 2024**	**FY 2025 Base**	**FY 2025 OCO**	**FY 2025 Total**	**FY 2026**	**FY 2027**	**FY 2028**	**FY 2029**	**Cost To Complete**	**Total Cost**
BR9: *Personnel & Airdrop Safety Technology*	-	3.337	3.092	3.097	-	3.097	3.742	3.745	3.785	3.823	0.000	24.621

A. Mission Description and Budget Item Justification

This Project funds the research and investigation of component technologies to enhance cargo and personnel airdrop capabilities for global precision delivery, rapid deployment, and insertion for force projection into hostile regions. Areas of emphasis include parachute technologies, parachutist injury reduction, precision offset aerial delivery, soft landing technologies, and airdrop simulation. Technologies support the Soldier Lethality Army Modernization Priority. New operational concepts call for increased precision of personnel and cargo in austere environments in which small units are dispersed and logistical supply is limited. The Army requires enhanced payload extraction and other increased capabilities to support the airdrop requirement for current and future vehicles exceeding aircraft payload weight capacity.

Work in this Project supports key Army needs and complements the technical research of several Program Elements (PEs) to include PE 0601102A (Defense Research Sciences), PE 0602143A (Soldier Lethality Technology) / Project BD6 (Soldier Sys Interfaces/ Integration- Sensor Tech), and PE 060311SA (Soldier Lethality Advanced Technology) / Project BE5 (Personnel & Airdrop Safety 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.

Work in this Project is performed by the Soldier Center (SC).

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2023**	**FY 2024**	**FY 2025**
Title: Personnel & Airdrop Safety Technology	3.337	3.092	3.097
Description: This effort investigates technologies that enhance payload extraction, which will allow current vehicles to be dropped with more armor and support equipment, and reduce the design constraint on future vehicles that have airdrop as an operational requirement, increase parachute gliding capabilities, and mature delivery accuracy of cargo aerial delivery systems that support varying payload weights. Research in the area of novel parachute materials will provide increased capabilities for cargo and personnel aerial delivery systems. This effort will support an investigation of new Modeling and Simulation (M&S) tools to develop validation methods for airdrop concepts. This effort also investigates technologies that advance airborne personnel insertion safety requirements to modernize the Airborne Soldier and provide the ability to effectively execute the airborne mission through reducing safety risk and increasing capabilities.			
FY 2024 Plans: Will investigate non-traditional delivery approaches and platforms to support resupply methods in dispersed, contested environments; design and develop personnel infiltration/exfiltration system fuselage to increase reliability with optional autonomous guidance and flight control for a soldier and their supplies; design and develop technologies to facilitate autonomous			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602143A / *Soldier Lethality Technology*	**Project (Number/Name)** BR9 / *Personnel & Airdrop Safety Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
long distance precision aerial delivery of multiple effects with expanded Global Positioning System (GPS) - degraded/denied capabilities (to include inclement weather, nighttime) and enhanced mission planning algorithms; mature models/simulation in support of cargo resupply methods and atmospheric constraints by analyzing and comparing with flight test data; ***FY 2025 Plans:*** Will investigate novel materials and design configurations for parachute components in support of weight and volume reductions; investigate survey technologies for establishing paratrooper situational awareness in operational scenarios; conduct investigations and maturation to advance developed Guidance Navigation and Control (GN&C) strategies in support of GPS degraded/denied resupply operations. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase reflects planned lifecycle of this effort.			
Accomplishments/Planned Programs Subtotals	3.337	3.092	3.097

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A